# IS DARWIN RIGHT?

OR,

# THE ORIGIN OF MAN.

BY

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# INTRODUCTION.

IN this volume I present to the public substantially what I have been presenting in my lectures for more than twenty-five years, giving here, however, greater prominence to the spiritual origin of man; for the question of man's natural origin is generally decided in the affirmative, and the great question now is as to the means by which the result was naturally produced. The writings of Lyell taught me in youth that the present condition of our planet is the result, not of miraculous achievement a few thousand years ago, but of the operation of natural causes during many millions of years. The "Vestiges of Creation" first led me to believe in man's natural origin; and my own investigations in mesmerism, spiritualism, and psychometry, showed me the defectiveness of the theories advanced by Darwin, Huxley, and others of the natural selection school. Nobler men do not live than some of them are in many respects; but when they seek to account for the existence of all organic forms, and entirely ignore the spiritual side of the universe, infinitely its most important side, their theories

cannot be otherwise than most radically defective. Scientific men run in ruts, as theologians so generally do: hence the popularity of Darwinism to-day. But, with a knowledge of the spiritual in the universe and in man, there will come a great modification of the views of naturalists regarding the origin of organic forms.

This work is written for the general reading public, and is made as plain as possible, that the average reader may understand its arguments, which I shall be very glad to see overthrown if they are not in agreement with absolute truth.

Twenty-two years ago I had a discussion with Mr. Garfield, now president-elect, on the subject of man's origin, many false reports of which have been published in some of his biographies, and in campaign documents in various Republican papers. In some of these I was represented as an atheist; one who was completely discomfited, but who sought during the debate to inveigle his opponent into the discussion of subjects not related to the matter in debate. Every statement is utterly false. In that debate I took the affirmative of the following proposition: "Man, animals, and vegetables are the product of spontaneous generation and progressive development; and there is no evidence that there was any direct creative act on this planet." Mr. Garfield took the negative, which required him to present evidence of direct creative action: this he neither did, nor attempted to do. If Mr.

Garfield then believed in man's miraculous origin, as given in the book from which he took the texts for his sermons, he did not choose to defend it, for reasons best known to himself; if he did not believe it, he stood before the public in a very false position. Nearly or quite every argument used by me in the twenty speeches made in that debate are given in this volume, to which Mr. Garfield was utterly unable satisfactorily to reply, and to which, I venture to say, neither he nor his friends can now reply.

I trust the time will come in our Republic when it will not be considered necessary to lie, either to vilify or glorify a candidate for its presidency.

WILLIAM DENTON.

WELLESLEY, MASS., Dec. 5, 1880.

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### MAN'S NATURAL ORIGIN.

We live in a world teeming with life. On the mountain-top, where winter reigns forever, with only snow for mould, there grow luxuriantly beautiful organic forms; the deep sea caves, illuminated only by the light that has struggled through a thousand fathoms of water, are crowded with tenants; sixteen hundred feet below the surface of the ground, in the darksome mine, lighted only by the occasional glimmer of a miner's candle, grow snow-white fungi on the massive timbers that support the shelving roof. Vegetable life: the pine clothing the mountain-side, the ash in the swamp, the chestnut on the ridge, the feathery palm, grass rolling in verdant waves, the fringing fern, the carpeting moss, the clinging lichen. Animal life: the humped buffalo feeding on the prairie, the lion lurking in the jungle, bears berrying among the bushes, sea-fowl overshadowing the rocky islet

like a cloud, seals scrambling over the rocks, and fishes in shoals moving through the waters. Life within life: animalcules everywhere, too small to be seen by the unassisted eye, but feeding on every leaf, and swimming in every drop. Man, monarch of all, inquiring, Whence these various living forms, and how came I into existence? One of the first questions of lisping infancy, and often the subject of greatest interest to the aged sage.

Answers to these questions, however numerous, range themselves into two divisions; those of the one ascribing all organic existences to the operation of natural law, and the other to miracle. There is nothing that the study of natural science so profoundly impresses upon the human mind as the universality and continuous operation of law. The more we become familiar with the heavens and the earth, the more clearly we see their varied phenomena to be the offspring of natural causes: indeed, the very existence of our planet and of similar bodies in space is now generally attributed to their action. Herschel, La Place, Comte, Humboldt, Mitchell, Agassiz, and, indeed, almost every scientific person familiar with the discoveries of astronomy and the facts of geology, have been led to believe that our planet, as well as the whole solar and astral systems, came into their present form by the operation of law.

Whirled from the sun probably, as drops are from a revolving grindstone, our planet was, by the law of grav-

itation, moulded into its present shape. As it cooled, a rocky crust formed upon its surface by the operation of the law of cohesion, which binds particles of matter together and forms solid bodies. Thus ice is produced in winter, and rock from the liquid vomited out of the volcano. In that rocky crust we find hundreds of minerals, produced by the law of chemical affinity, which unites unlike particles of matter, and by their union produces new substances. Oxygen, an invisible gas, and calcium, a yellowish-white metal, combine, and form lime; lime and sulphuric acid unite, and produce gypsum; oxygen and silicon are changed into silica, which we see in the form of quartz and flint, and the more precious forms of agate, amethyst, and opal. Many of the minerals thus formed are in symmetrical shapes, such as cubes, octagons, and hexagonal prisms; and in them we see the operation of another law, that of crystallization, by which mineral atoms, under favorable conditions, arrange themselves in beautiful order, so that when the substance is known, and the conditions surrounding it, we can tell with certainty the shape that it will assume.

When we thus learn that law has been operating for millions of years, rounding the globe, forming its crust, producing the various minerals that constitute the substance of that crust, and shaping them into symmetrical forms, what more natural than to believe that the domain of law extends over the organic productions that suc-

ceeded these? The operation of cohesion depends upon the previous operation of gravitation; for, unless gravitation brought the particles of matter near, cohesion could not bind them; the operation of chemical affinity, in the production of mineral substances, depends upon the previous operation of cohesion; no lime could be formed by the union of oxygen and calcium, if cohesion had not first brought the particles of calcium together; neither could crystallization produce its forms, unless the other laws had pre-existed and pre-operated. Hence we have a natural pyramid, of which gravitation is the base, and crystallization the summit.

If these are all natural, if no miraculous agency is concerned in their manifestation, why, when we advance but a step beyond, should we drag in miracle to account for what we behold? Immediately above crystallization is vegetable and animal life; above organic life, sensation; and above sensation, reason; and why may not these additions to the pyramid be just as natural as the underlying courses?

Where shall we call in miracle to aid in its erection? There seems to be no greater step from crystallization as seen on a window-pane in a frosty morning, or in the dendritic forms which the oxide of manganese occasionally assumes (Figs. 1 to 3), to the simplest forms of life, such as the jelly-like amœba, than there is from the amorphous mass of quartz which cohesion produces, to

the transparent hexagonal prism, which is the product of crystallization.

Why should we consider the crystal, with its gleaming sides, to be natural, — the product of law, — and call in the supernatural to account for a being so low in the scale of existence that it does not even possess a stomach, and appears to be as simple in structure as a drop of gum?

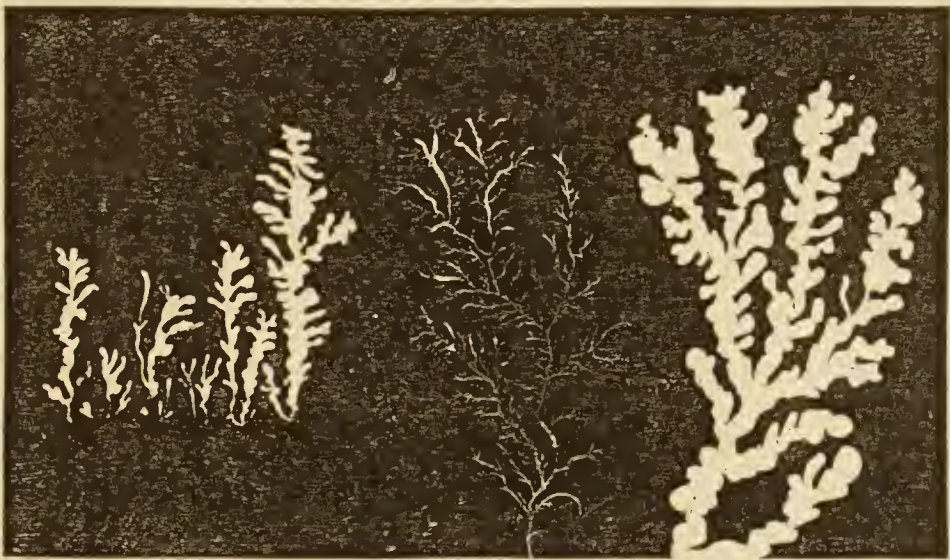



FIG. 1. FIG. 2. FIG. 3.

Fig. 1. Dendrite on Slate; 2. Dendrite on Chert; 3. Dendrite on Sienite. (Original.)

Breathe on the window-pane on a cold winter's morning, and mark the result. Obedient to the law of crystallization, see how those particles of frozen moisture range themselves in beautiful order! No regiment ever moved at the word of command with greater precision, no tree ever leafed or blossomed into more perfect beauty, than these arborescent crystals, that, but for their frequent appearance, would astonish and delight us. Examine

the snow-flakes that drop by millions at our feet (Fig. 4). When particles were first arranged into an organic being, is it not probable that the process was just as natural in that case as in the others?

Nearly all intelligent persons now acknowledge that the rocks composing the earth's crust were formed by the operation of natural law; granitic rocks by the slow cooling of fiery fluid matter under pressure; metamorphic

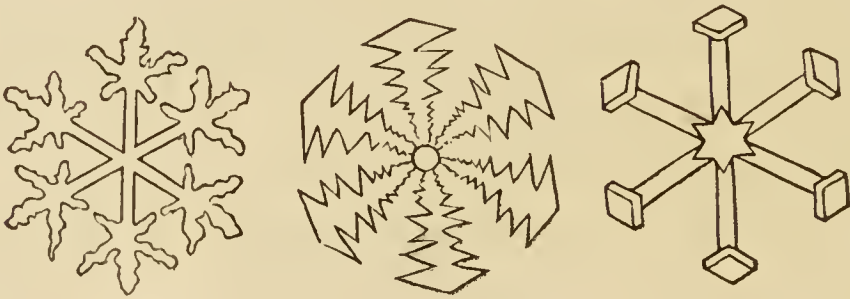



FIG. 4. Snow-Flakes.

rocks from the decomposition and disintegration of the granitic, and the re-formation and crystallization of the material; and the fossiliferous rocks by the agency of water, and the assistance of plants and animals.

No person at all acquainted with geology now believes that seas, rivers, lakes, and mountains were made by miracle, though this notion was once very common. In accordance with law, the mountains were heaved, the ocean's bed hollowed, the valleys formed; by its operation we have sunlight and darkness, thunder, lightning, and storms; by it rivers run, oceans ebb and flow, and

the wide domain of life is under its continual jurisdiction.

But a few years ago the thunder's roll in the heavens was the voice of a personal deity; the lightning's flash was the glare of his angry eye; the tornado, that found a paradise before it and left a desert behind it, was the blast of his nostrils; and the earthquake, that swallowed a city at a gulp, was his agent to punish a guilty people. Now, back of the lightning and thunder, we discover the electricity that goes up with the ascending vapor: the intensely heated atmosphere precedes the hurricane, and beneath the earthquake lies the cooling globe. The oil that we burn in our lamps, the coal we consume in our stoves, the salt, the iron, the silver, and the gold, were all deposited where we find them by natural causes. From the rounded acorn, a hundred of which may be carried in the pocket, grows by imperceptible degrees the oak, whose branches overspread an acre; and from an almost invisible egg a Lyell is developed, who reveals the secrets of the earth's deep foundations, and a Humboldt, before whom the whole scientific realm lies like a map. And though provinces of nature have been repeatedly set aside, and we have been solemnly assured that they were exceptions to the rule, yet, as science has advanced, these have become so narrowed, we may be sure that universal intelligence will make all men eventually believers in the universal operation of natural law.

These laws are, as I believe, but the modes of operation of an unseen, but ever present, ever active, and what, for want of a better word, we must call intelligent, spirit; but a spirit which, as far as we can tell by our own experience and that of our fellows, operates invariably by law: and it is therefore most reasonable to suppose that all forms of life, including man, have come into existence by natural processes, which we may reasonably suppose are still at work upon our globe.

The great mistake that many scientists as well as theologians appear to me to make, is in supposing that this is a dead world, in a dead universe, and only made alive by the operation of some exterior force. Darwin thinks that all living beings came from one or a few forms, "into which life was first breathed;" thus giving us a dead world, into which an exterior power breathed life. If this was ever done, the great probability is that life was breathed into a man. Why should a miracle-worker bridge the chasm between death and life for an invisible monad, when the bridge would just as easily carry a man?

The difference between the universe such persons believe in, and that in which we live, is great as the difference between a natural tree and an artificial one. In the artificial tree, made in a day, a wooden trunk is fashioned, holes are bored, limbs inserted, twigs put into them, and leaves and fruit attached. It may appear beautiful; but

there is no life in its heart, no sap in its branches, no circulation through its leaves. It is no more a tree than the chair in which its maker sits. The natural tree requires centuries for its perfection, but it is alive from deepest radicle to topmost leaf. Break a branch, and every rootlet feels and responds to the demand for material to repair damages. Day and night the living currents flow through its veins, bearing color to the blossom, honey to its cup, sugar to the fruit, and down for its cheek to ward off the attacks of the insect robber. Strip off every leaf, and it re-clothes itself; and, though winter makes it bare a hundred times, a hundred times it renews its beauty. No less alive is the world in which we dwell, and the universe of which it forms to us such an important part; and it is this that rendered man a possibility upon our planet.

## NATURAL LAWS.

### VITALITY.

The first agent that appears to have been, and to be concerned in the production of living beings, is Vitality. As there is a crystallizing force, that under favorable conditions produces crystals, without preceding crystallic germs from which they grew, so there appears to be a life-producing force, which, from what some call "dead matter," under favorable circumstances produces

animals and vegetables in their simplest forms. Philip Henry Gosse, the well-known English naturalist, says, "If we take a bunch of leaves, of the common sage for example, or a few twigs of hay, and, tying them into a bundle, suspend them in a jar of water, allowing the contents to remain untouched, but exposed to the air, some interesting results will follow. If we examine it on the second day we shall find a sort of scum covering the surface, and the whole fluid becoming turbid and slightly tinged with green. If now we take with the point of a quill or pin a minute drop of this liquid, and examine it with a good microscope under a magnifying power of about two hundred diameters, we discover the water to be swarming with animal life."

Wherever we place organic substances in decay, if the air in never so small a quantity can get at them, living beings will be produced. The common supposition is that germs or eggs floating in the atmosphere drop into the vegetable infusions, and there find conditions favorable for their development. This is of course possible: it is even probable. To know whether they do, or not, has been the aim of a great many distinguished experimenters, who are about equally divided in opinion.

In July, 1862, Professor Wyman of Harvard College, Cambridge, published in "The American Journal of Science" the results of thirty-seven experiments, undertaken for the purpose of determining whether living

beings could be developed in a closely-sealed vessel, where previously neither life nor the germs of life existed.

The juice of beef and mutton, solutions of sugar and gelatine, and some other substances, were used in these experiments. In all of them the juice and solutions were exposed to the heat of boiling water, and in four of them to a heat of from 250° to 307°, or from 38° to 95° above the boiling-point, from fifteen minutes to two hours. In some cases the necks of the glass vessels containing the solutions were heated red-hot and twisted round before the exposure to the heat; and in others, after boiling, the air was allowed to pass into the vessels through an iron tube filled with wires heated to redness, or through a glass tube filled with asbestos and platinum-sponge red-hot; so that if any living germs had existed in the air they would have been destroyed in their passage. After being thus filled with air, these latter vessels were also hermetically sealed, and left in a warm apartment.

In the course of a few days or weeks, life was found in all of them except two, and even in one that was heated to 307°, which is far beyond what experiment has demonstrated to be the limit of vital endurance.

Professor Clark of Harvard College, who gives a detailed account of these experiments, says, "The fact that the experiments with the sealed flasks proved, if any thing can be proved beyond the reach of change or

improvement, is that beings with motion, undoubted living beings, were produced where life could not have existed previously.[1] No failures to obtain living beings under any circumstances can overthrow the evidences of spontaneous generation furnished by such experiments as these.

More recently Dr. Bastian has experimented under conditions still more unfavorable. He placed boiling

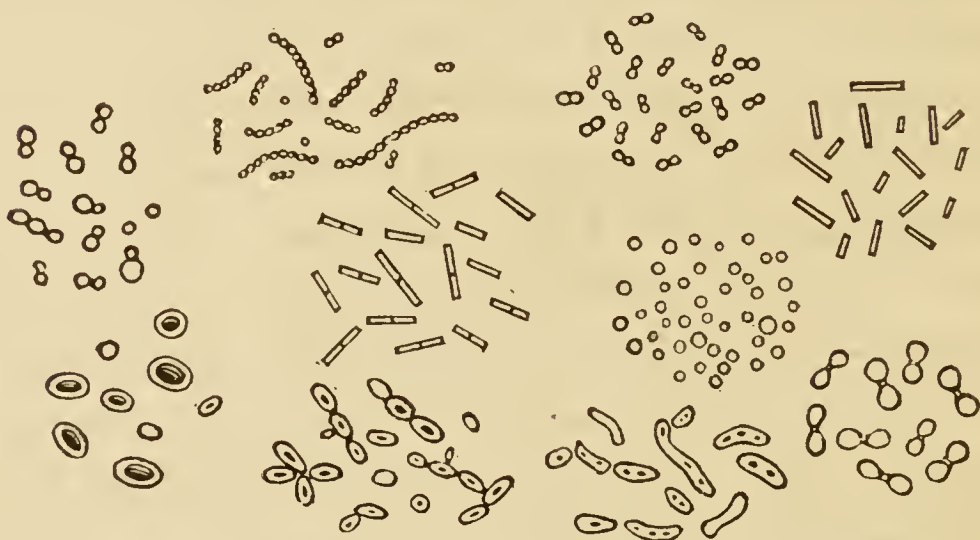



FIG. 5. Some of the most common forms of life, supposed to have been produced spontaneously: *Bacteria*, *Torulæ*, &c., 800 times the natural size. (After Bastian.)

solutions of sugar, carbonate of ammonia, phosphate of soda, and turnip-juice, in glass vessels; and, while the steam from them was issuing from the necks of the vessels, they were hermetically sealed, and placed in an iron digester, where they were exposed for four hours to a heat of 295° Fahrenheit. Yet even under these extreme

[1] Mind in Nature, p. 26.

conditions minute organic forms were found in the liquids after a few days[1] (Figs. 5 and 6).

Professor Cantoni of Pavia has obtained infusoria in the fluids of hermetically sealed flasks, after an exposure in a Papin's digester to a temperature of 242° F.[2]

Some remarks of Mr. Wallace regarding the experiments of Bastian, detailed in his "Beginnings of Life," are valuable. "Some of these comparative experiments are very suggestive. Hay infusion, for instance, exposed

FIG. 6. *Bacteria*, *Torulæ*, and other infusoria, found in an infusion of common cress, in an air-tight flask, after it was heated to 272° F. for twenty minutes. Magnified 800 times. (After Bastian.)

to air, produced abundance of *bacteria* in forty-eight hours, and these had increased considerably in sixty-eight hours. A similar infusion, sealed up after the fluid became cold, behaved in a similar manner. The same in a flask with a neck two feet long, and having eight flexures, remained unchanged for twelve days. A similar infusion, hermetically sealed during ebullition, on the other hand, showed turbidity in forty-eight hours,

[1] Beginnings of Life, vol. i., pp. 456–475. [2] Beginnings of Life, vol. i., p. 436.

which subsequently increased, and *bacteria*, *vibriones*, *leptothrix*, and *torulæ* were found in abundance. Here, then, whatever inference may be drawn from the first three experiments is entirely negatived by the fourth. Other experiments show that ammonia-tartrate solution, sealed in *vacuo*, at a temperature of 90° F., produced in eighty-four hours abundance of bacteria; while the same solution, if boiled at 212° F., and exposed to the air in flasks covered with paper caps, remained quite clear for nine days; yet as soon as it was inoculated with living bacteria, they increased rapidly, and produced turbidity. These, and a number of other equally suggestive experiments, indicate that the conditions favorable to the *origin* and to the *increase* of these low forms, are not always identical. Both are very complex; and we cannot avoid the conclusion that the advocates of the universal germ theory have been somewhat hasty in founding their doctrine upon insufficient data, for the most part of a negative character."

Thousands of experiments have been tried, first and last, to settle this question whether living beings are produced without parentage; yet, in the estimation of many eminent scientists, it remains undecided yet. Pasteur, Tyndall, Huxley, and others, do not believe we have any evidence of life without pre-existent life to produce it; while on the other side we have Bastian, the author of "The Beginnings of Life," Clark, Wyman, some of whose

experiments have been given, Draper, the well-known physiologist, Wallace, and Owen, the greatest living comparative anatomist.

The fact that life abounds wherever conditions are favorable for its development, that even hot springs have their tenants, that every island is peopled, and every lake and stream has living forms adapted to its waters, indicates that life as naturally develops by virtue of inherent law, as crystals, under favorable conditions, from mineral solutions.

In the production of crystals we see many of the phenomena which are displayed in the production and growth of organized beings. All crystals are formed of small, angular solids, as all organized bodies are of cells. There has been a germ controversy regarding the formation of crystals, as there is now one regarding the formation of living beings; some chemists supposing that minute crystals floating in the air were the cause of crystallization in mineral solutions.[1] As animals can be modified by surrounding conditions, so can crystals. "Common salt usually crystallizes in the form of a cube; but, if urine be present in the solution, it takes the form of the octahedron."[2] When carbonate of lime is slowly precipitated in viscid solutions of gum, instead of the particles arranging themselves in octahedral or hexagonal crystals, the combined particles assume the form of

[1] Beginnings of Life, vol. i., p. 300.

[2] Youmans' New Chemistry, p. 50.

calculi, with distinct concentric layers. Crystals can even make repairs, so that when an angle is broken, it will be replaced. Mr. Rainey, quoted by Bastian,[1] tells us of the appearance of the first visible globules, when carbonate of lime is precipitated in a viscid solution. "The appearance which is first visible is a faint cloudiness; the particles are too small to be seen by the microscope; in a few hours exquisitely minute globes appear, too small to be measured, then dumb-bell-like bodies and egg-shaped particles with them, and these gradually enlarge." In fact, the appearances are at first almost identical with those that are seen in vegetable infusions, as organisms gradually form in them.

Tyndall's experiments seem to many persons to demonstrate that all living beings must come from germs. He placed in sixty glass flasks an infusion of turnip-juice. The ends of the flasks were drawn out to a fine point; and, after the infusion had boiled for five minutes, the small end was closed by melting the glass with a blowpipe. They were taken to the Alps, in Switzerland, in the month of July. The ends of four of them had been broken on the way, and these were full of life; the rest, except two that were destroyed, were all clear. The fifty-four were exposed to the sun by day, and placed in a warm kitchen at night: four were casually broken, but the fifty remained perfectly clear; there was no life in them.

[1] Beginnings of Life, vol. i., p. 303.

Then twenty-three of the fifty were opened in a hay-loft, and the remaining twenty-seven on the edge of a cliff overlooking a glacier. All the flasks were then placed in a warm situation near a stove, with the necks open; and in three days twenty-one out of the twenty-three opened in the hay-loft were filled with living beings; while after three weeks those opened near the glacier were without a trace of life.

It is evident that in this case there was something in the air of the hay-loft that was favorable to the development of life; but it by no means follows that this consisted of germs or eggs. The experiments of Wyman, Mantagazzi, Bastian, and a host of others, many of whom have had much more practice than Tyndall, who have found living beings in sealed glass vessels after they had been exposed to a heat much more than sufficient to kill germs if they had existed, can never be negatived by such experiments as Tyndall's, were they multiplied a thousand-fold.

In the flask of the experimental philosopher to-day we have, apparently, on a small scale, what existed on the earth during the early geologic periods on a large scale; and, if living beings are produced to-day by the operation of natural causes, there is no need to call in miracle to account for their appearance long ago.

It may be objected that there existed no juice of beef or mutton, infusions of vegetable matter, nor solutions of

minerals produced from organic substances, in the early condition of our planet, as there were in the sealed flasks of the experimenters. True; but there were warm oceans, containing matter in an extremely fine state of subdivision from the action of water on rock for ages, and containing as much life as infusions do when subjected for hours to a heat of 295°. The liquids in the flasks, we may reasonably suppose, are only favorable to the development of life, because they give us the necessary components of organic bodies in an extremely divided state. In both cases the matter is destitute of life; and the production of living beings in unorganized matter, to-day, reveals to us, apparently, how it came into existence in the beginning.

## VARIATION.

Vital force, however, appears only to produce life in extremely minute forms; and these, by the ordinary process of generation, could only continue to produce similar forms. There must have been a power and a disposition to deviate from the original stock, or the first living beings would have perpetuated only forms similar to themselves, and filled the world forever. But there is in nature a disposition to vary, or a law of Variation. We say like produces like; and this is true, but like produces unlike, also: the boy is like his father; but no boy is exactly like his father, nor girl like her mother; and in

most large families, and some small ones, there will be a child of whom the father asks, "Who does that child take after? I am sure it is no one on our side of the house;" and the mother is equally sure that it is no one on her side of the house. A variation in the offspring has made its appearance, for which the progenitors are unable to account. The seeds of apples and peaches, as we know, produce fruits that differ from those of the parent trees. By taking advantage of the tendency in plants to sport into varieties, our gardeners are constantly producing new flowers and improved fruits.

Dr. Hooker, quoted by Lyell, says, "The element of mutability pervades the whole vegetable kingdom; no class, no order, nor genus of more than a few species, claims absolute exemption from it." So strong is the tendency to variation, that seedlings from fruit of the same tree and in the same season differ at times considerably. Col. Le Couteur, who paid great attention to wheat-culture, found that the grains of wheat in the same ear differed so greatly that he was compelled, in his attempts to grow the best, to select each grain separately.[1] Van Mons, Darwin informs us, "reared a multitude of varieties from the seed of one grape-vine, which was completely separated from all others, so that there could not, at least in this generation, have been any crossing; and the seedlings presented the analogues of every kind,

[1] Animals and Plants under Domestication, vol. i., p. 378.

and differed in almost every possible character, both in the fruit and foliage." [1]

In Darwin's Origin of Species we are told of two flocks of Leicester sheep, kept by Mr. Buckley and Mr. Burgess, and purely bred from the original stock of Mr. Bakewell for upwards of fifty years. There is not a suspicion existing in the mind of any one at all acquainted with the subject, that the owner of either of them has deviated in any one instance from the pure blood of Mr. Bakewell's flock; and yet the difference between the sheep possessed by these two gentlemen is so great that they have the appearance of being quite different varieties.[2]

## TENDENCY.

We cannot, however, regard variation as a creator. It may change the color of a snail's shell, but how could it give to the snail a fin? it may modify the tail of a fish, but we cannot conceive of its forming a foot; in a man it may give a longer finger or toe, but it could not put an eye at the end of his finger, or an ear at the end of his toe. Variation, to be of service in the production of the higher forms of organic being, from the simple forms spontaneously produced, must operate in a definite direction, and there must be underlying it the power to push

[1] Animals and Plants under Domestication, vol. i., p. 401.

[2] Origin of Species, p. 39.

the organic form subject to it to a more advanced stage. How could an animal destitute of wings vary until it became a bird? Suppose it to be an amphibian, like a frog, variation undirected would be as likely to operate in an infinite variety of ways as in the direction of feathers and wings. Suppose a variation in a frog in the direction of the bird, it could hardly fail to be a detriment; and the animal in which it appeared, in the struggle for life, would be more likely to die than to live and perpetuate the bird-like peculiarity. Pin-feathers on a frog would neither help it to swim, dive, nor jump; and, the more like wings its forelegs were, the less use they would be in administering to its necessities. If the first step in the direction of a bird could be taken, for which no cause can be imagined, how could it be retained till the chance came among an infinite number of another variation concurring with the previous one, and pushing the animal a step nearer to the bird? The chances are almost infinite against the possibility of such a second step being taken. How long, by any hap-hazard process, would it be before an amphibian was transformed into a bird? Millions of concurring steps, balancing each other, would be necessary; and it would seem that the whole time of our planet's life would be exhausted before more than the merest beginning could be made. Behind variation must be Tendency. Without the eyes of tendency, variation would wander blindly in an aimless maze

forever; with this for a guide it has unerringly struck the road to fish and reptile, beast and man. Tendency compels variation, and variation in certain directions; forming steps by which life advances to the highest forms.

### HEREDITARY TRANSMISSION.

But, unless these varieties could be transmitted to the descendants of their possessors, they would die with them, and never influence their progeny. Variation has become operative in producing advanced forms of life by the influence of another law, — that of Hereditary Transmission. The existence of this law is known to nearly all, but the potency of its influence is known to but few. An English paper informs us that a man six feet six inches in height was summoned before a court; and the questions asked him on that occasion revealed the fact that his father was six feet three inches, his mother six feet, and his four brothers and sisters averaged six feet three inches.

The Jew has a strongly aquiline nose, and this nose is represented on the faces of Jews in Egyptian paintings that are more than three thousand years old. The very nose that figures on the face of the Jew that walks down Broadway to-day, adorned the countenance of Abraham as he sat at the door of his tent in the days of old.

Early in the last century a child was born in Suffolk, Eng., with semi-horny excrescences of almost half an

inch in length thickly growing all over his body. The peculiarity was transmitted to his children, and was last heard of in a third generation.

The persistence of mental traits, in consequence apparently of the operation of inheritance, is remarkable. As Ribot remarks, "The French of the nineteenth century are, in fact, the Gauls described by Cæsar. In the Commentaries, in Strabo, in Diodorus Siculus, we find all the essential traits of our national character: love of arms, taste for every thing that glitters, extreme levity of mind, incurable vanity, address, great readiness of speech, and disposition to be carried away by phrases. There are in Cæsar some observations which might have been written yesterday. 'The Gauls,' says he, 'have a love of revolution; they allow themselves to be led by false reports into acts they afterwards regret, and into decisions on the most important events; they are depressed by reverses; they are as ready to go to war without cause as they are weak and powerless in the hour of defeat.'"[1]

So strong is this law of heredity, that even accidental variations and artificial deformities are at times transmitted. Ribot tells us that a man whose right hand had suffered an injury had one of his fingers badly set. He had several sons, each of whom had the same finger crooked. He quotes Quatrefages, who tells us that the

[1] Heredity, p. 110.

Esquimaux cut off the tails of the dogs they harness to their sledges, and the pups are often born tailless.[1] The tendency to transmit a perfect form is, however, much stronger than the tendency to transmit deformities, or there would be no necessity for the Jew to practise circumcision, or the descendants of many generations of shavers to torment their faces with a razor.

By the operation of the law of vitality, the waters of the early oceans were caused to swarm with minute living beings. By the law of variation, governed by innate tendency, these commenced, as soon as they began to propagate, to deviate from the ancestral form toward higher organic forms; and, by the law of heredity, the deviations were transmitted, and new and more advanced forms of life came into existence.

The law of hereditary transmission appears at first to be antagonistic to the law of variation; for, if it operated perfectly, there could be no deviation from the parental form; but tendency, operating with variation, overrides heredity, as the power of the magnet upholds its armature contrary to the operation of gravity.

## MODIFICATION.

In addition to these is another important law, that of Modification. A pine that will grow in a temperate climate to one hundred and fifty feet, on the timber-line of

[1] Heredity, p. 9.

the mountains is no higher than a man's head, though its trunk may be as thick as his body. In the Southern States the Virginia cherry grows to the height of one hundred feet, but at the Great Slave Lake it is but five feet high. The service-tree in Western Virginia is frequently eighty feet high: on the Rocky Mountains, in Wyoming, it is only a bush. In all these cases, surrounding conditions have modified the plant subjected to them. The cabbage in the West Indies grows to be a small tree. Animals living in high mountain regions, where the air is rare, have lungs adapted to the atmosphere they are compelled to breathe. Men in such countries have broader shoulders and longer trunks than those living near the sea-level. Lyell tells us of some Englishmen who were carrying on mining operations at a high level in Mexico, who sent to England for greyhounds of the best breed, that they might hunt the hares which abounded in the country. It was found, however, that, owing to the rarity of the air, the greyhounds were compelled to lie down and gasp for breath, while the hares ran off with ease and left them. But the whelps of these greyhounds, when grown up, could run down the Mexican hares just as easily as their progenitors had done English hares; for they had become modified to suit the conditions that surrounded them.[1]

Of the cabbage and the cauliflower Lyell says, "A bit-

[1] Principles of Geology, p. 594.

ter plant, with wavy sea-green leaves, has been taken from the sea-side, where it grew like wild charlock, has been transplanted into the garden, lost its saltness, and has been metamorphosed into two distinct vegetables, as unlike each other as each is to the parent plant, — the red cabbage and the cauliflower."[1] I suppose there are persons, who, if asked to name which of all the plants was most likely to have been specially created for the service of man, would unhesitatingly reply, the cabbage; and yet the cabbage has been made by man, out of a plant very unlike the modified product.

But Lyell remarks, "It is easy to show that these extraordinary varieties could seldom arise, and could never be perpetuated in a wild state for many generations, under any imaginable combination of accidents." They show the wonderful power of surrounding conditions to mould the organic forms subjected to them; and these are sufficient, as we know, to produce differences as great as those that distinguish species; but, apart from innate tendency, it is, I think, extremely difficult to pass beyond this step in a progressive direction.

All large caves have tenants which have become modified by the peculiarities of their underground life. Professor Schiödte discovered, in three Austrian caves, the proteus, a wood-louse, and three kinds of beetles, all blind, or the eyes reduced to rudimentary specks.

[1] Principles of Geology, p. 588.

In the Mammoth Cave is a blind fish, which has on the exterior no visible eyes. We are told by some that here is evidence demonstrative that all animals were miraculously formed for the places that they occupy. The blind-fish was made for the Mammoth Cave; and the Creator, knowing that it would live in absolute darkness, made it destitute of eyes. When, however, we examine the almost transparent blind-fish, we see that this explanation of its origin does not at all harmonize with the facts. In the head of the blind-fish, beneath where its eyes should be, two small dark objects appear under the skin: these are eyes; and attached to them is the optic nerve, leading to the optic lobe of the brain, as in fishes having full possession of sight. How shall we account for this? Consider the blind-fish a miraculous creation, and its peculiar construction can never be explained. It was evidently modified into its present peculiar form. The Mammoth Cave was hollowed by a stream that once ran upon the surface, and was occupied by fish, as our streams are to-day. This stream found a crevice in the lime-rock, and down it went, introducing its fish to a life of darkness. Conditions were so unfavorable that most of them perished, but this survived. For want of the stimulus of light, the eye became smaller. Tie up your right arm, and never use it, and it will shrivel to half the size of the left in a twelvemonth. It transmitted this diminished eye to its descendants born in this cave;

their eyes became smaller still, for want of stimulus, and retreated into the head; and, in process of time, the skin covered the eye, and the blind-fish of the Mammoth Cave was produced.

Many insects and crustaceans are found in this cave, in some of which the eyes are absent, and in others they are reduced to mere specks. Fig. 7 represents a carabid

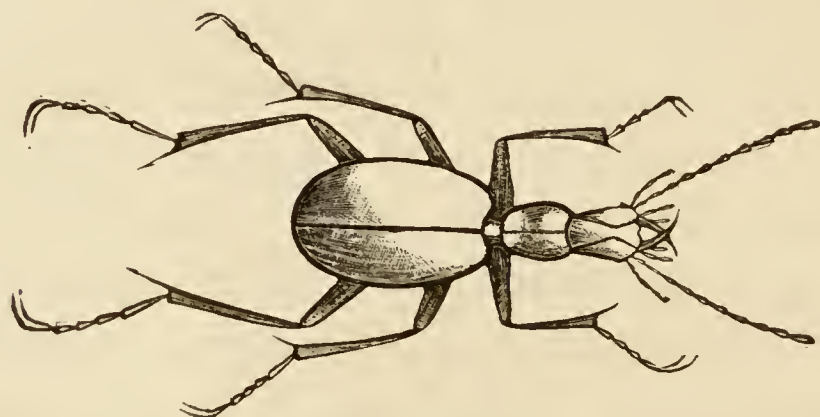



FIG. 7. Anophthalmus Telkampfii. (After Packard.)

beetle, first found in the Mammoth Cave by Tell Kampf, from whom it receives its specific name. It is destitute of wings and totally blind, and has doubtless become wingless and blind in consequence of the disuse of wings and eyes resulting from its cave life. The *Hadenœcus subterraneus* (Fig. 8) is a wingless grasshopper, found also in the Mammoth Cave. I caught it, or one closely allied to it, in Wyandotte Cave, Indiana. Its antennæ and legs are proportionally longer than those of its relations found on the surface, probably because they had to do duty for eyes. In the Wyandotte Cave of Indiana

is also a blind fish, almost, if not absolutely, identical with that of the Mammoth Cave. The caves are too far apart for the fishes to have descended from the same modified progenitors; but the conditions surrounding them, after they were swept into the respective caves, being almost identical, they have been modified into similar beings.

I have seen a tadpole four years old, kept in a drug-

FIG. 8. Hadenœcus Subterraneus. (After Packard.)

gist's store, out of the sunlight: conditions were unfavorable for its perfect development; and, although a giant, it was only a gigantic tadpole.

The notornis and the apteryx are small, wingless birds, found in New Zealand; and the dinornis, palapteryx and aptornis were wingless birds that once lived there, but are now only known by their fossil remains. These birds, living in a country where beasts that might prey upon them were unknown, and where flight was unnecessary

for food, their wings were so little employed that they became too small for flight, and by disuse have so diminished, that in some living species the wing is only represented by a horny claw.

External surroundings cannot, however, create hands, feet, eyes, ears, and brains. The cavern darkness has taken away the exterior eyes of the *amblyopsis;* but light has failed to give eyes to the protozoa, though they have been on the planet since the Laurentian times. Webbed feet are very useful to water-birds, but the water never made them. The water-ousel lives almost entirely in the water, like a duck; it feeds on shell-fish and water insects; its food and habits are almost the same as the grebe; its ancestors lived a similar life for as many years as naturalists have been acquainted with them, and probably for a million years before that: yet its feet are no more webbed than those of a sparrow. There must be tendency before formation. An idiot can fire a palace of beauty, and leave only a pile of ashes; but to build one requires an architect.

From the dawn of life upon our planet, animals and plants have been surrounded by constantly improving conditions: the intense heat has diminished, poisonous gases have been eliminated from the atmosphere, the land surface of the globe has increased, and, accompanying this advance, organic forms have improved, as geology demonstrates, with every new group of rocks

deposited. Had sunlight departed from the world in the silurian age, birds, beasts, and men had never appeared upon our planet. Had the climate and atmosphere of the carboniferous period remained, it is not probable that man could ever have been developed here. The power to produce a frog exists in the tadpole, but light is essential for its operation; and thus there lay in the fœtal globe the power to produce a man, but the improvements of millions of years were essential to mould him to his present form, and it will require millions more to perfect him.

SYMMETRY.

Another law that has operated in the production of organic beings is the law of Symmetry. Lop off the

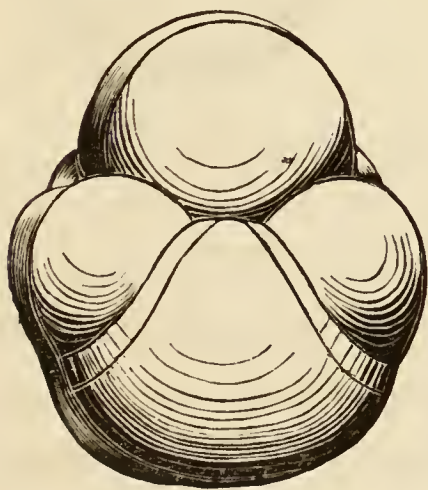
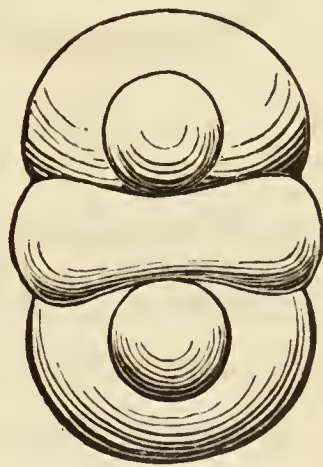



FIG. 9. FIG. $9\frac{1}{2}$.
Clay-Stones from the banks of the Connecticut River. (Original.)

branches of a young tree, till there is nothing left but a bare stick, and soon a branch will grow to the right,

another to the left, a new stem will shoot upward, and branches will symmetrically develop from this, and the tree is a thing of beauty once more. The very clay stones (Figs. 9, 9½, 10, 10½), that grow in some clay beds, beneath the water-level of their locality, manifest as perfect symmetry as the crystals in the rocks below them, the flowers that bloom above them, and the human beings that see and admire them. The right hemisphere of

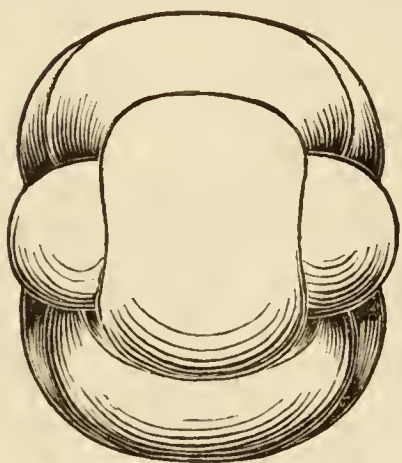
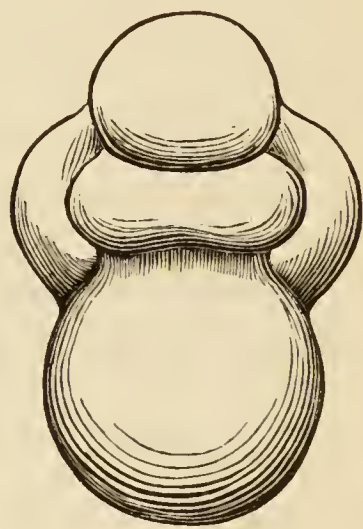



Fig. 10. Fig. 10½.
Clay-Stones, foot of Mount Tom, Mass. (Original.)

man's brain corresponds with his left; and he thus has two brains, as he has two nostrils, two eyes, and two ears. Almost every part of his body is duplicate.

Even diseases are symmetrical. Mr. James Paget, quoted by Mivart in his "Genesis of Species," referring to symmetrical diseases, writes, "A certain morbid change of structure on one side of the body is repeated in the exactly corresponding part of the other side."

He figures a diseased lion's pelvis from the Museum of the College of Surgeons, and says of it, "Multiform as the pattern is, in which the new bone, the product of some disease, comparable with a human rheumatism, is deposited, — a pattern more complex and irregular than the spots upon a map, — there is not one spot or line on one side which is not represented, as exactly as it would be in a mirror, on the other. The likeness has more than daguerreotype exactness."

Symmetry, then, is one of the tools used by the omnipresent spirit in moulding the frame of man; and we are symmetrical because the law of symmetry has presided over the upbuilding of our structure.

### NATURAL SELECTION.

Then, we have the law of Natural Selection, so ably elucidated by Charles Darwin. I do not believe that it has been as effectual in its operation as Darwin and the Darwinians suppose; but, that it has assisted in producing our present forms of animal and vegetable life, there can be no doubt. It is the gardener that trims the tree of life, lops off the imperfect branches, and destroys the sprouts that might divert its energies; but it is not the creator that gave life and form to the tree, and sent through its veins the invigorating sap.

Life pushes into the field continually more beings than can possibly survive. A cod will produce at a birth from

four to nine millions; a full-grown elm will perfect in one season a hundred million seeds; a pair of rabbits in a hundred and fifty years, if they were unrestrained, would stock the entire land-surface of the globe. The result of this superabundance of life is a grand struggle for existence, in which the weak, the ill-formed, the bad-conditioned, are killed off, and those animals and plants most in harmony with their surroundings survive, and perpetuate their harmonious organization to their posterity. In a fish, that which assists it in the struggle may be denseness of scale, length of fin, or length of tooth, enabling it to distance its pursuers or hold its slippery prey; in the bird it may be length of wing, strength of claw or bill, or some modification of color, by which it baffles the keen eyes of its enemies: whatever gives an animal or plant the advantage, puts a weapon into its hands, with which it kills those who do not possess it, and it then appropriates the place for itself, and entails it for those of its posterity who possess the same advantages. Thus the most perfect types of organized being are preserved by a general providence, that watches with sleepless eye, and works for the benefit of the whole.

In Scotland we find a red grouse feeding among the red heather of the mountains and moors. "Here is a special providence," says a believer in the miraculous: "the hawks and the eagles, that hunt by sight, cannot see the red grouse among the equally red heather, and

thus it escapes." But suppose that originally grouse were white, and one, by the operation of the law of variation, was born red: the hawks and eagles being unable to see it, it escapes, and gives birth, by the law of inheritance, to birds of its own color; they also escape; the white ones being all the time weeded out, in consequence of being so conspicuous, the grouse are at length all red as we find them. Here is a providence that cares for hawks and eagles as well as grouse: it watches over flea and philosopher, and works for the perfection of every living creature. By the operation of these and doubtless many other laws, through the immense ages of our planet's past, life has advanced, as a tree advances to fruit, and we are here as the grand result.

"But do you mean to say," inquires an objector, "that these blind laws, to which you have referred, could ever make the seeing eye, the hearing ear, the thinking brain, and the soulful man?" Most emphatically no! But the laws are by no means blind: they are to me the modes of operation of the all-seeing and all-knowing spirit, without whose direction a man could no more be produced from the "insensate clod," than a bowlder rolling down a mountain torrent could be fashioned into a perfect copy of the Venus de Medici by the accidental blows of the rocks with which it came in contact. Grant a law of life: what should cause this life to be manifested in a sexual form and be thus perpetuated?

Grant a law of variation: mere variation would operate to make an animal smaller as well as larger, less perfect as well as more perfect, to form an eye behind as well as before, on the tail as likely as the head; it would start a nose on the hand as readily as the face, an ear on the foot, and develop a tongue between the fingers as readily as between the jaws. How long would it be before undirected variation could produce a perfect eye in an animal otherwise blind? About as long as it would take for the letters of the alphabet thrown promiscuously down to arrange themselves into a beautiful poem.

But we cannot leave these laws out of sight, nor deny their operation. I hear two men discussing about the way in which babies become men. "I tell you, they do it," says one. "Who do it?" says the other. "Why, the fairies."—"Do what?"—"Why, transform the babies into men."—"What have the fairies to do with it, pray?"—"They have every thing to do with it, and without their influence such a thing as a man could never be."—"But how do you suppose the fairies accomplish this work?"—"I will tell you: you have noticed that babies sleep a great deal?"—"Certainly."—"Well, that is when it is done: they pass inside the child, for you know they can go anywhere and do any thing; they enlarge the brain, expand the skull, extend the limbs, and, in short, do all that is needed to be done to make the infant into a man."—"But did you ever see this pro-

cess, which you thus describe?" — "Oh, no! the fairies, you know, are invisible, and therefore we can never see them at work." — "But how, then, do you know that the fairies do all this?" — "Because there is no other way in which we can account for such a wonderful change as the transformation of a baby into a man." — "I regard your story as a monstrous fable." — "How, then, do you think that babies are changed into men?" — "Well, I do not profess to know entirely how it is done, but there are some things connected with the matter that I do know: you have noticed that babies frequently require nourishment?" — "Yes." — "Well, that has a great deal to do with it. If they did not take food into the system, they would die, and could not become men. You must have noticed also that they breathe: this is of great importance; and if they were prevented, for even a few minutes, death would be the consequence. They sleep also: and this is important; lack of sleep would end in lack of life, and the transformation of the baby into the man would cease." Then I hear the first exclaim, "But do you mean to say that blind eating, drinking, sleeping, and breathing, can change an utterly helpless and know-nothing infant, weighing eight or ten pounds, into the strong and hearty man, who masters the world, scales the heavens, and makes all the forces of nature minister to his needs?" To which the second replies, "Oh, no! I do not say that: more than all else, infinitely more, is

the spirit of the child derived from the father and the mother. It is this that presides over its organization, from the time it is an all-but invisible dot till it is born, and then makes eating, drinking, breathing, and sleeping subservient to the building-up of the wondrous structure that we call a man.

So the universal spirit, never for an instant absent from the world, has operated by means of these laws during millions of years, and through myriads of forms, till at length it was able to say, "I have made a man, but millions of years will even yet be necessary to finish him."

## POINTERS INDICATING MAN'S NATURAL ORIGIN.

### METAMORPHOSIS OF ANIMALS.

In addition to these laws, whose existence can be demonstrated and their operation seen, there are what I call pointers, which, although they do not demonstrate that man came into existence naturally, and without the operation of miracle, yet they point very significantly in that direction. The first pointer is the metamorphosis of animals, or the change of form that they undergo from the time they are conceived until they are fully formed. All animals are alike to the eye when in their primitive egg state; and, in passing to their mature form, all the

higher animals go through a series of significant changes. J. W. Draper, the well-known physiologist, says, "All animals proceed from eggs as simple in structure as the simplest infusoria produced spontaneously, and no art can distinguish one of the highest class from one of the lowest." Professor Clark, of Harvard College, Cambridge, says, "All animals, from the monad, the gum-drop amœba, up to man, at one time cannot possibly be distinguished from one another. . . . You could not tell the

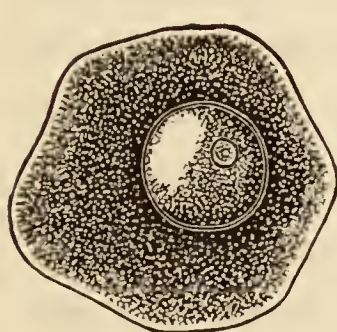
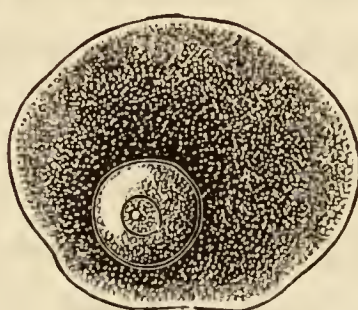
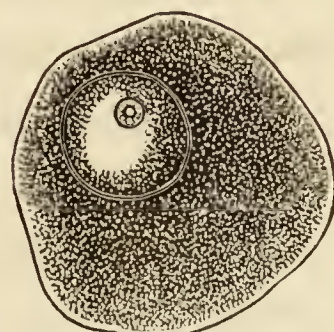



FIG. 11. FIG. 12. FIG. 13.

FIG. 11. — Primitive Egg of a Trout. FIG. 12. — Primitive Egg of a Hen. FIG. 13. — Primitive Human Egg. (After Haeckel.)

one from the other any more readily than you could distinguish a drop of water from Cochituate Lake from that of Mystic River." (Fig. 11, Fig. 12, and Fig. 13.) So, it is highly probable that man's original ancestors, in the earliest ocean containing organized life, were equally undistinguishable from the progenitors of other types of life that swarmed in the ocean with them.

The mosquito is first an egg, then a worm; at last an insect on filmy wings, "blowing its shrill trumpet," as it

prepares to attack us for our blood. The silkworm is an egg, then a worm, eating and growing from thirty to forty days, when it weaves its enclosing case, and passes into the chrysalis state. While in this condition strange transformations take place: its jaws are changed into a coiled tongue, its stomach is shortened, compound eyes take the place of simple eyes, antennæ make their appearance upon the forehead, wings spring from the sides, and out issues the queenly moth.

The frog commences its existence, like all other animals, with the egg, as we see them in spring in the pools by the wayside, surrounded by jelly. In about a month it leaves the egg, but it is in a very imperfect condition. The head is quite large; but there are no traces of ears, nostrils, lungs, or even gills. About the fourth day after its birth, ears and nostrils make their appearance, and little branching gills. The mouth is soon furnished with a horny beak, and the tail is lengthened and widened: the animal is now a tadpole, and we should call it a fish if we did not know what it was destined to become. It breathes by means of gills, as the fish does, propels itself through the water with its long, broad, flat tail, as the fish also does, and feeds upon the plants that grow in its watery abode: there is no trace of either internal or external limbs. In the hinder part of the body two bud-like swellings appear, and two like them in the front, which develop into limbs, when the tail is gradually

absorbed, and at length disappears from sight. While these changes are taking place, others, less observable but more important, are going on. The mouth increases in size and gape; the horny lips are replaced by teeth; the intestines are shortened; the gills dwindle in size; the lungs, that before were solid and small, enlarge and become cavernous; the fish-heart is modified, a third chamber being developed by the expansion of one of the large arteries; the vessels that convey blood to the gills are gradually suppressed, the work of the gills is at length forever done; the water is no longer a suitable place of abode; the frog gasps, takes its first full breath, leaps upon the land, and croaks its joy at finding itself in such a superior condition. (Fig. 14.) But the other day it was a fish feeding upon water-plants, with a horny beak; and now it is a frog, with rows of teeth, a changed stomach, and a changed appetite, and woe to the fly that comes within the range of its glutinous tongue!

Why is the insect first a worm, and the frog first a fish? Geologically we have reason to believe that worms preceded insects, and fishes preceded frogs, by millions of years; and it appears that every animal shows us in its development the road over which its ancestors travelled during the early ages of the world.

What is true of all animals below man is equally true of him. The existence of man on this planet com-

mences with an ovum, or egg, formed in the body of the female, which is about $\frac{1}{150}$ of an inch in diameter, or barely visible to the naked eye. It contains a yolk, con-

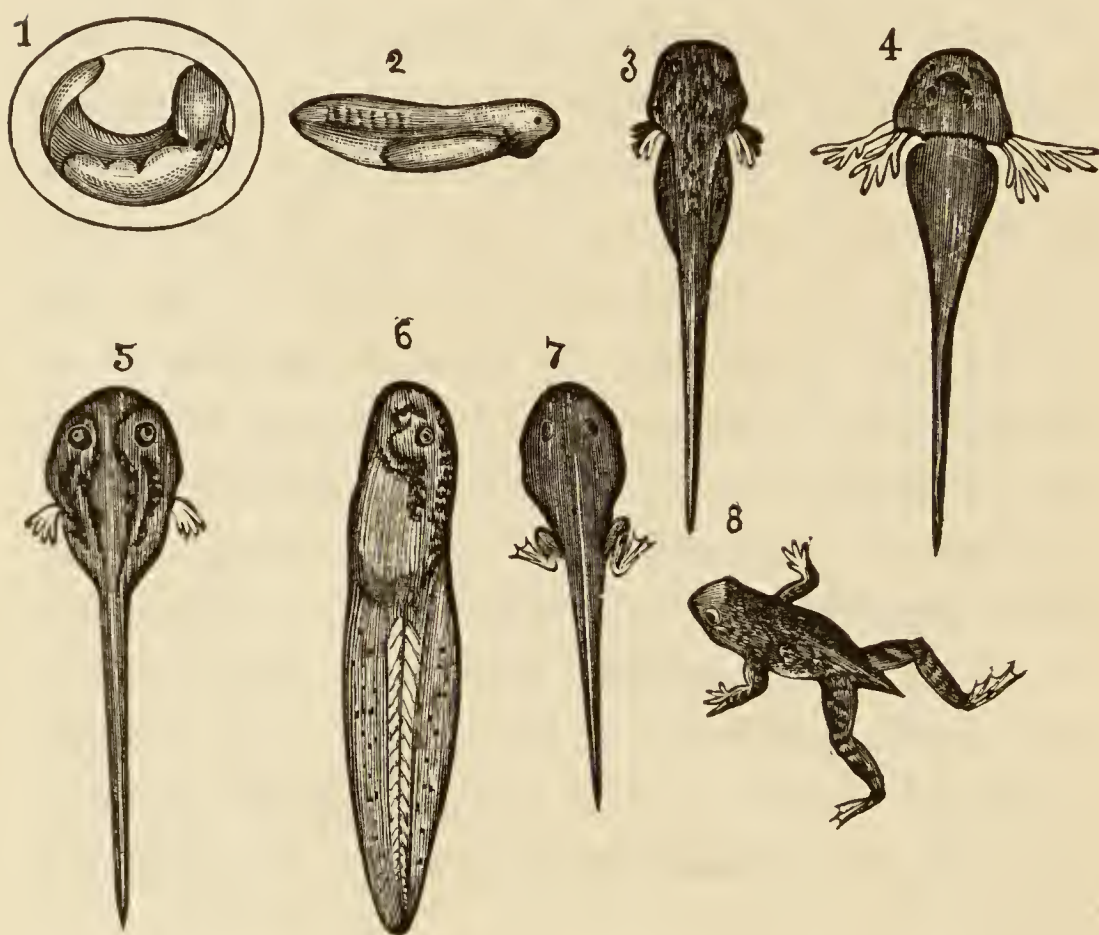



FIG. 14.—Metamorphosis of the Frog. 1. The embryo frog in the egg; 2. At a more advanced stage; 3. Tadpole four days after being hatched; 4. At a more advanced stage; 5. A stage farther, when its gills have dwindled; 6. The perfect tadpole; 7. The gills are now gone, and hind limbs are seen; 8. Frog nearly perfect.

sisting of a multitude of granules; and in this is a transparent vesicle which is called the germ vesicle, and this contains a small round dark spot called the germ-spot. (Fig. 15.)

When impregnated by the sperm-cells of the male, the

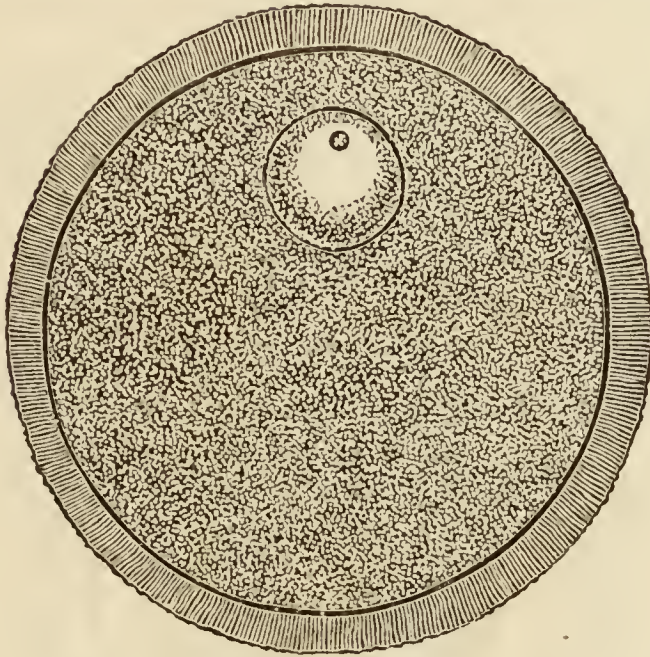



Fig. 15. — The Human Egg greatly enlarged. (After Haeckel.)

germ vesicle and germ-spot disappear, and the egg then

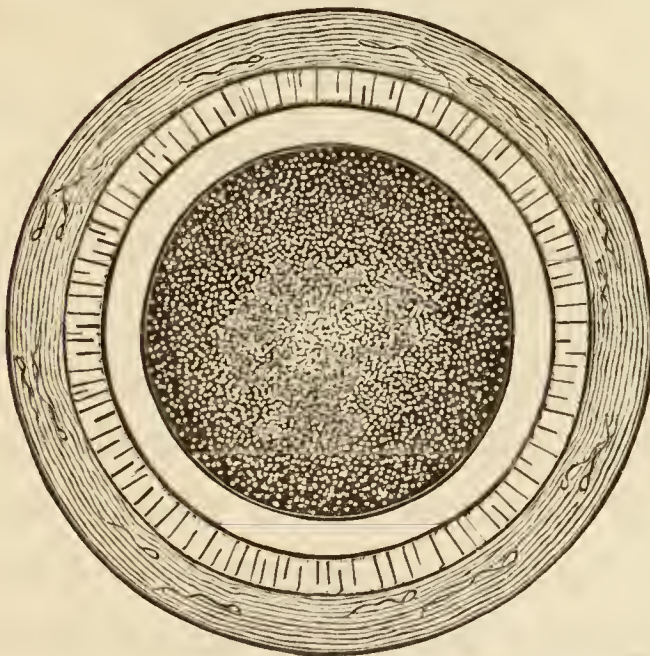



Fig. 16. — The impregnated Mammalian Egg. (After Haeckel.)

presents the appearance of a drop of gum or speck of jelly (Fig. 16), resembling the simplest forms of life known to us, the amœba.

Soon after its formation a round kernel is formed in its interior, which occupies the centre of the cell; and in the centre of that is a small dot called the nucleolus. This cell, the product of both parents, in which the first

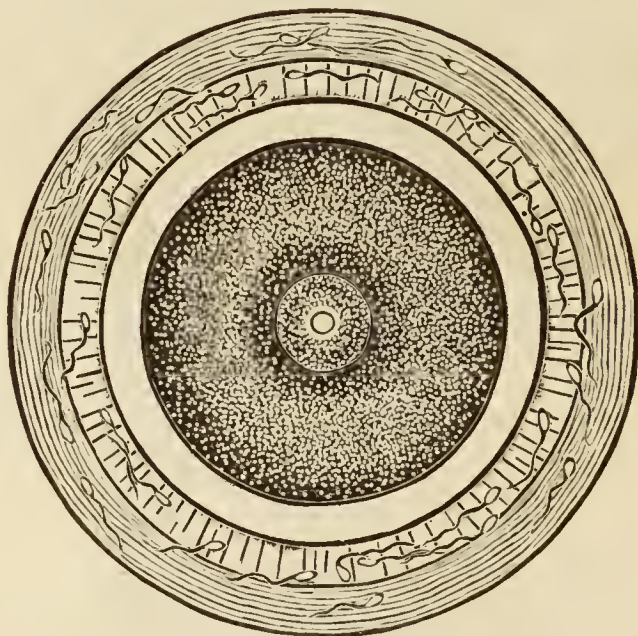



Fig. 17. — The Mammalian Egg shortly after impregnation, when it is called the Parent Cell. (After Haeckel.)

germ of the future individual appears, is called the parent cell. (Fig. 17.)

The next step in the evolution of the man is the division of the kernel into two, just as the amœba divides to form a new animal. (Fig. 18.) These repel each other, separate, and attract the matter contained in the parent cell, and thus form two cells, which contain, as the first did, a nucleus and central dot or nucleolus. The cells soon change from a globular to an oval form. (Fig. 19.) One of the two is larger and more transparent than the

other; and, as the cells continue to divide, the larger and lighter increase at a quicker rate than the cells produced

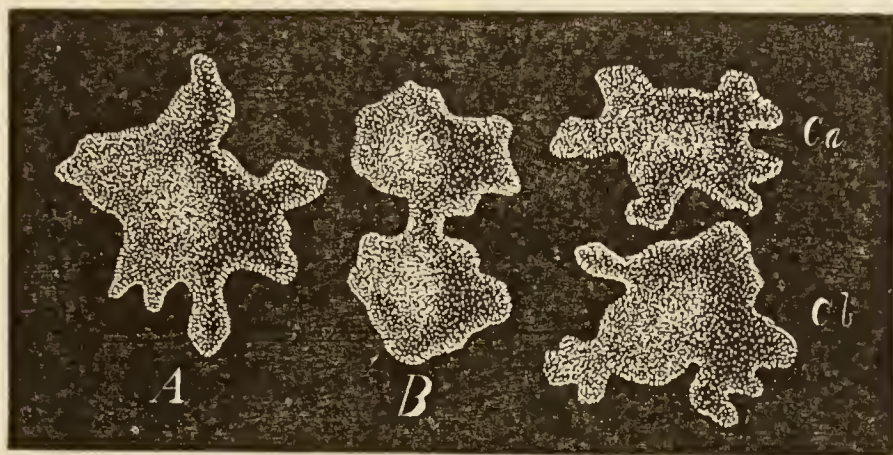



FIG. 18.—An Amœba in the act of reproduction. *A*. The whole Amœba: *B*. The Amœba dividing; *Ca* and *Cb*. The two halves, now independent individuals. (After Haeckel.)

from the smaller and darker, till they form what is called

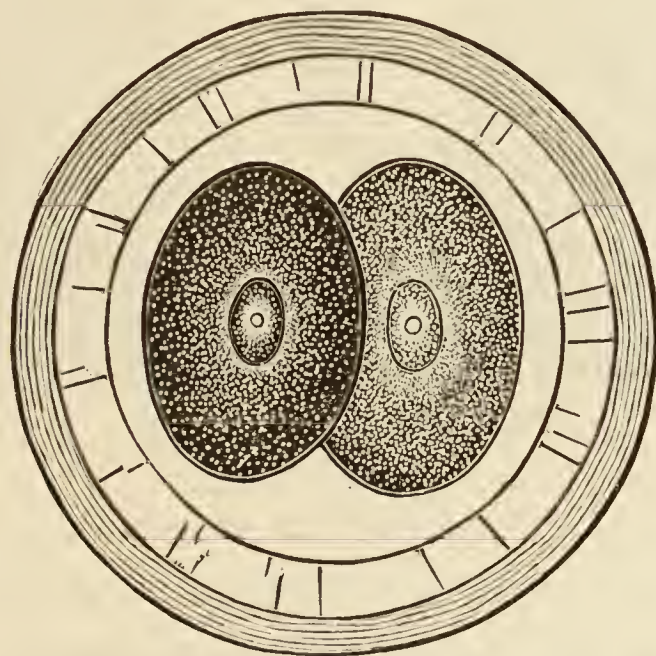



FIG. 19.—Commencement of Cleavage in the Mammalian Egg. (Haeckel.)

a morula or mulberry mass, consisting of a multitude of small cells, of which the organs of the future animal are

to be built. The larger, lighter, and more active cells form eventually a layer, called the animal layer, from which the skin, the spine, the spinal marrow, the brain, and the entire bony skeleton, are produced; the smaller, darker, and more sluggish cells also form a layer, called the vegetative layer, from which the organs of digestion and reproduction are made.

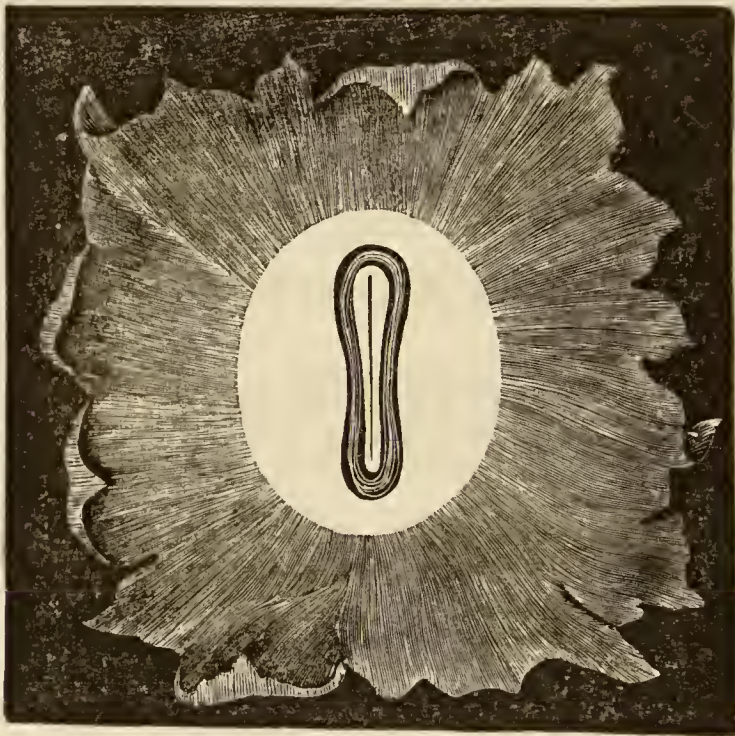



Fig. 20. — The Primitive Trace.

These layers form a circular germ-area, the centre of which is occupied by a transparent area, which is likewise circular. In the centre of the transparent space, in the germ-area, a line makes its appearance, where the future spinal column will be: this is called the primitive trace, which is the foundation of the man. (Fig. 20.)

At the end of the second week the human being is one-twelfth of an inch in length: as yet there is no distinction between fish, reptile, bird, mammal, or man, all being formed in the same way, and having the same appearance.

The trace enlarges, its edges thicken, rise, and bend forward in front, till they join, and form a tube, which is destined to contain the brain and spinal cord: this is sometimes called the spinal tube. At the same time the edges of the under side of the primitive trace bend backward, curve, unite, and form a second tube, which becomes the abdominal cavity, enclosing the alimentary canal and the reproductive organs: this is sometimes called the intestinal tube. When the human being is three weeks old, it is about one-sixth of an inch in length: a swelling exists where the head is to be, and the first rudiments of the eye, the ear, and the brain, make their appearance. The limbs are entirely wanting, there is no real face, and nothing to distinguish man from opossum, dog, or ape.

At the end of the fourth week the human embryo is nearly half an inch long; the head with its various parts can be plainly distinguished; the heart shows all four compartments, and nearly fills the chest cavity; the rudiments of the lungs appear, and all the essential parts of the body may be seen. Yet even now, as Haeckel says (to whose work "The Evolution of Man," I am indebted

for most of this description), in this stage we are still unable to discern any characters essentially distinguishing the human embryo from those of the dog, the rabbit, the ox, the horse, or, indeed, of any of the higher mammals." (Figs. 21, 22, 23, 24.) It is true, the head is a little

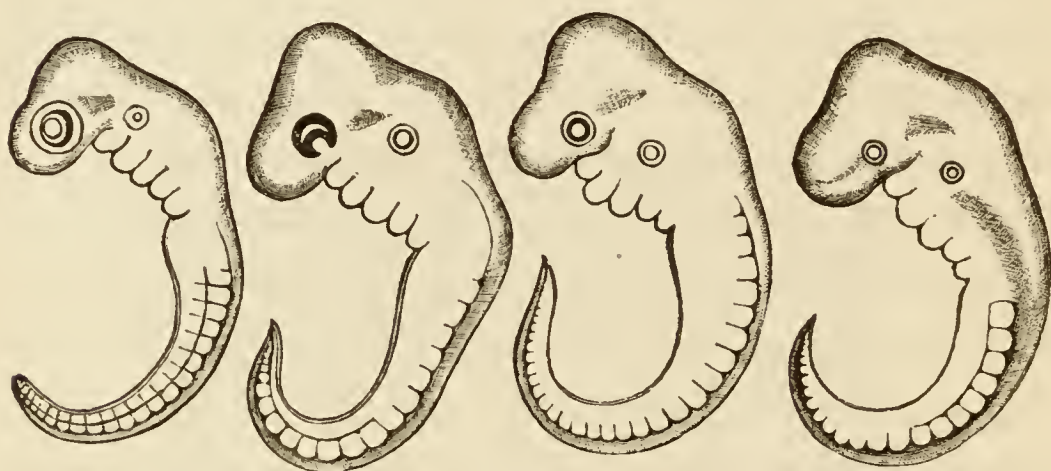



FIG. 21. FIG. 22. FIG. 23. FIG. 24.

FIG. 21. — The Embryo of the Fish at an early period of its development. FIG. 22. — The Embryo of the Chick. FIG. 23. — The Embryo of the Hog. FIG. 24. — The Embryo of the Man.

larger in man than in the hog, and the tail is a little shorter; but the tail of man when he is a month old is double the length of his legs.

At eight weeks old the human embryo can scarcely be distinguished from that of the highest apes, but after this its human character is firmly established.

Dr. Roget tells us that "the human embryo is not exempt from the same metamorphoses" (that is, those to which the lower animals are subject), "possessing at one period branchiæ and branchial apertures similar to

those of the cartilaginous fishes, a heart with a single set of cavities, and a brain consisting of a longitudinal series of tubercles; next losing its branchiæ, and acquiring lungs, while the circulation is yet single, and thus imitating the condition of the reptile; then acquiring a double circulation, but an incomplete diaphragm, like birds; afterwards appearing like a quadruped, with a caudal prolongation of the sacrum, and an intermaxillary bone; and, lastly, changing its structure to one adapted to the erect position."[1]

Agassiz says of the human brain, "It first becomes a brain resembling that of a fish, then it grows into the form of that of a reptile, then into that of a bird, then into that of a mammiferous quadruped, and finally it assumes the form of a human brain; 'thus comprising in its fœtal progress an epitome of geological history, as if man were in himself a compendium of all animated nature, and of kin to every creature that lives.'"[2] And Agassiz' conjecture is probably the exact truth, and the correct explanation of these wonderful resemblances. Huxley says, "It is very long before the body of the young human being can be distinguished from that of the young puppy." It may be considered an unfortunate circumstance, that the mental similarity continues much longer.

[1] Roget, Bridgewater Treatise, vol. ii., p. 443.

[2] Preface to Footprints of the Creator.

But why do human beings resemble protozoans, the simplest forms of life; then worms, brainless fishes, true fishes, so that they even have gills and gill apertures; why do they advance through forms that closely resemble those of the reptile, the bird, the lower mammal, and the ape, before they assume the proper human type? Are not these so many steps by which man has ascended to his elevated position? Is it not safe to say that if there had never been a protozoan, produced spontaneously, there never could have been a worm; without a worm never a fish; without a fish never a reptile, bird, or man?

All the facts connected with man's metamorphoses from the egg to the perfect being, and they are millions, unite in pointing to man's natural and therefore to man's brutal origin. In this sense the brute is father of the man.

### ANATOMICAL SIMILARITY.

Another pointer is the anatomical similarity between man, and the lower animals. The number of limbs in the vertebrates of all ages has been four. The first true fishes balanced themselves with four fins, as our present ones do; their forward fins corresponding with our arms, the hinder ones with our legs. The reptile walks with four feet; the bird with two, because the other two have become wings, and are needed for flight: they are but

feathered arms. The monkeys are said to have four hands; but in reality they have two feet, that are frequently used as hands, which they somewhat resemble, and two hands that are frequently used as feet.

We share our digits with vast numbers of both living and extinct forms. Our earliest star-fishes have five fingers (Figs. 25 and 26), as have most of our living ones.

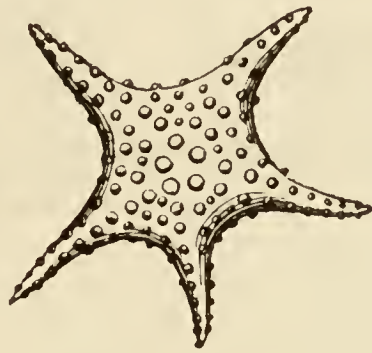



Fig. 25. Fig. 26.

Fig. 25.—*Palæaster Ruthveni.* Fig. 26.—*Palasterina Primæva.* Both from the Upper Silurian of Great Britain. (After Salter).

The fingers of the crinoids are always some multiple of five, while their cups, when angular, are always five-sided, and their stalks nearly always so. The old labyrinthodon left a five-digited track on the Triassic sandstones, that looks marvellously like the impression of a rude human hand. (Fig. 27.) In the foot of the musk-rat, in the paw of the bear and lion, in the flipper of the dolphin, the wing of the bat, and the undivided paddle of the whale, are the same number of bones, and in the same places, as in the hand of the man who writes an article to disprove man's natural origin.

Man has seven cervical vertebræ in his neck; so has the giraffe that feeds upon the mimosa-trees, twenty feet high, and the pig that can hardly be said to have a neck at all.

All the higher apes have the same number of vertebræ

FIG. 27. — Track of the Labyrinthodon.

as man; their teeth are the same; and so close is the general resemblance between them and man, that Owen, our highest authority in comparative anatomy, says, "I cannot shut my eyes to the significance of that all-pervading similitude of structure — every tooth, every bone, strictly homologous — which makes the determination of the difference between *homo* and *pithecus*" (that is, between man and the monkey) "the anatomist's difficulty."[1] As late as the sixteenth century, human anatomy was taught and studied from the skeleton of the monkey alone. The anatomical differences that exist between the various families of monkeys are greater than those that exist between the anthropomorphous apes — such as the chimpanzee, the orang, and the gorilla — and man.

[1] Journal of the Proceedings of the Linnæan Society of London for 1857.

Why this close anatomical resemblance? A miraculous creator could hardly be supposed to follow the same model in creating man that was used for these brutes, so immeasurably his inferiors; and in this similarity of form, which exists between man and the animals below him, we have a pointer whose significance may be denied, but can hardly be doubted.

### LINKING FORMS.

The linking forms, which exist between man and the lowest types of life, constitute another pointer. Man does not float like a balloon, completely cut off from all below him, but is united with the lowest organisms by a series of animal forms, that are like so many layers of stone in a pyramid, of which he forms the apex. It is now generally acknowledged that animals and plants are so closely linked in their lowest forms, that they pass into each other by insensible gradations. The protozoa, as Page says in his geological hand-book, "appear almost to occupy a sort of neutral ground between animals and vegetables." Hence they are called by some naturalists *Phytozoa*, or plant-animals. Professor Clark, one of the best of microscopists, says, "To this day there remains a doubt as to the animal or vegetable nature of certain forms, which have characters that lead on the one side to plants, and on the other to animals."[1] Sponges have

[1] Mind in Nature, p. 151.

been placed on both sides of the line by many naturalists; and, though now regarded as animals, they are rooted, manifest no feeling, and appear lower in the scale than some plants with which we are acquainted.

It is but a step from the protozoa to the opalina, a creature covered with vibratory cilia, that is frequently classed with the protozoa, but is allied very closely to certain worms. Various classes of worms carry us near to the line of the lowest of the vertebrates, like the amphioxus, a fish, and yet destitute of skull, brain, jaws, limbs, and jointed vertebral column. Step by step we pass along the line of the fishes, till we come to forms which are exceedingly difficult to class either with fishes or with amphibians. The proteus of the Austrian caves, the lepidosiren or mud-fish, and the axolotl of Mexico, are fish-like animals with long tails, and possess both lungs and gills. In the water they can breathe by means of their gills, and in the air by means of their lungs. In zoölogical works to-day these forms are sometimes classed with amphibians and sometimes with fishes. From the amphibians to the true reptiles the distance is not great; but from the reptiles that crawl, to the birds that fly, the space is wide: geology, however, enables us to bridge or nearly bridge the chasm between them. The pterodactyle was a flying lizard with bird-like characteristics. (Fig. 28.) The Jurassic and cretaceous beds furnish us with skeletons of dinosaurs that walked upon their hind-

legs alone, and were apparently on the march to the bird; while Solenhofen presents us with a bird having reptilian teeth and a reptilian but feathered tail, and the cretaceous beds of Kansas have yielded birds with reptilian jaws and bristling teeth. (Fig. 29.)

FIG. 28. — Restored Skeleton of the Pterodactyle. The species represented is *Pterodactylus Crassirostris*.

There is considerable space to-day between the bird and the mammal, and doubtless we shall yet discover between them many intermediate fossil forms. Yet in the ornithorhynchus we see a mammal with webbed feet; broad flat jaws, destitute of teeth, that resemble those of a duck; an animal that has but one excretory orifice, like a bird, and produces eggs, but they are hatched before they leave the oviduct.

When we advance from the lower mammals to man, we approach a chasm that has been regarded as infinitely wide and that requires a miracle to span; but, as Huxley says, "no absolute structural line of demarcation, wider than that between the animals that immediately succeed us in the scale, can be drawn between the animal world

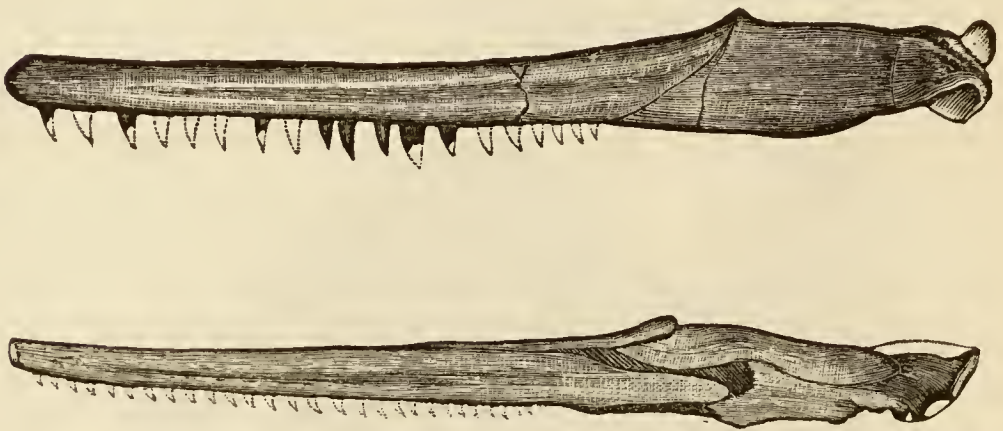



Fig. 29. — Jaws of Fossil Birds from the Cretaceous Beds of Kansas. Lower Jaw of *Ichthyornis Dispar*. Lower Jaw of *Hesperornis Regalis*. (After Marsh.)

and ourselves." If we look at brain-capacity, where we find the greatest disproportion between the quadrumana and man, we learn that the difference between the brain-capacity of the average Australian and the largest Caucasian is five and a half cubic inches greater than between the average gorilla and the smallest Australian. If the small brain-capacity of the Australian will not prevent him from rising in the scale of manhood till individuals of his race shall equal the highest Caucasian brain endowment, the nthe smallness of the brain-capacity of

the ape-like forms that parented humanity may not have prevented them from advancing to the brain-capacity of the lowest Australian. The fact, however, is, as has been frequently said, man is widening the gap between himself and the lower animals continually, and must have been doing so for ages, by killing off the animals that are most like himself, their wants and his being almost identical, and by advancing in cerebral power and general manhood. What the brain-capacity of the animals was, from which human beings are directly descended, it may be difficult to say, as they have long since perished; but human skulls of the greatest age show us, by the general smallness of their size and their inferior development, that the gap between brutality and humanity was, in all probability, much narrower in ancient times than it is at present.

I do not suppose, as Darwinians do, that all the steps taken by animals in their progressive march were necessarily minute. They may have been as great as would enable animals to pass from one variety to another, and in some cases the steps may have been as wide as those that separate specific forms of the same genus. There may be indeed a magnetic force, of whose operation we have obscure indications, that in the past time of our planet's history was much more active than at present, and by whose agency greater organic changes took place, and with greater rapidity, than is possible at the present time.

### RUDIMENTARY ORGANS.

One of the most significant pointers is the existence of what are called rudimentary organs, or what might be more properly called redundant organs. In addition to those organs which animals possess, that are in general use, there are other organs or parts of organs, that are not of the slightest utility, but point back to ancestral forms of life, in which they were of use. All ruminants, except camels, are destitute of incisors in the upper jaw. Most persons are familiar with the fact that the cow has a hard pad, occupying the place which in us is occupied by the upper incisor teeth. The unborn calf, however, has incisor teeth in the upper jaw, that never cut through the gum, and are therefore never of the slightest use to the animal. As the blind-fish of the caves lost its eyes because it never used them, so these animals, we may suppose, are descended from an animal that possessed incisors in the upper jaw and used them; but some descendant of this animal, by a variation in its structure, was able to crop grass by a lateral motion of its lower jaw, the assistance of its tongue, and mere pressure upon the upper jaw, and in process of time the upper incisors were lost. The unborn animal never having been modified, in the fœtal calf we have a representative of the unmodified upper-incisor-using ancestor, probably of the early tertiary times.

The horse and its probable ancestors furnish us with interesting examples of rudimentary or redundant organs. In the leg of the horse we find what are called splint bones, which answer to the index and ring fingers of the human hand: there are, however, no exterior toes to correspond with these interior bones, except in special cases, in which horses are occasionally seen with two small hoofs attached to these bones. Until the discovery

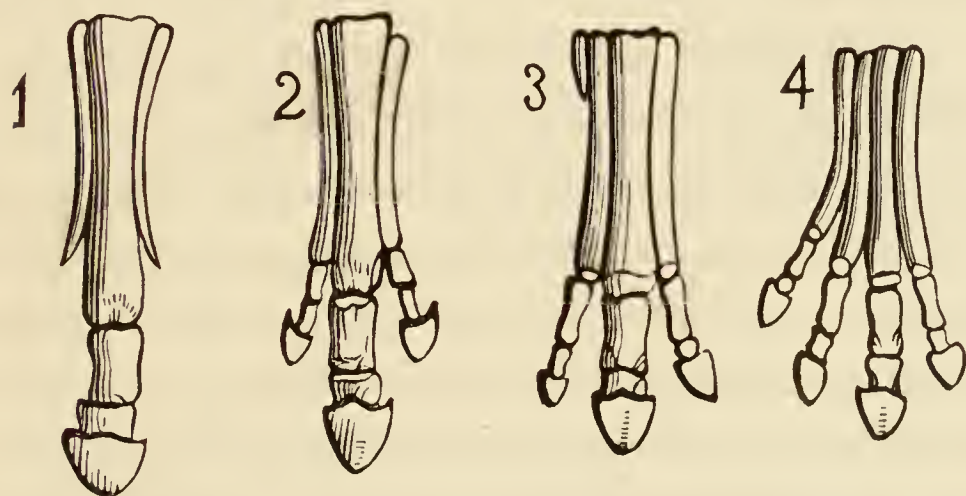



Fig. 30.—Modifications of the Foot of the Horse. 1. Foot of the Recent Horse; 2. Foot of the Hipparion; 3. Foot of the Miohippus; 4. Foot of the Orohippus. (After Marsh.)

of horse-like animals in the tertiary deposits, no one could imagine what was the meaning of these bones and the occasional appearance of extra hoofs.

In European beds belonging to the pliocene, the highest division of the tertiary, we find an animal called the *hipparion*, about the size of an ass, but greatly resembling the horse in anatomical structure. It had, however, a small toe on each side of the hoof, that never reached

the ground. (Fig. 30.) If this animal, which was very abundant before the horse made its appearance, was the ancestor of the horse, we may account for the splint bones in the leg of the horse, and the occasional appearance of dangling toes on its leg. They are heirlooms from the ancestral *hipparion.* But what is the meaning of the toes that never touch the ground in the leg of the *hipparion?* To discover the meaning of these, we must go still farther back.

In the miocene beds of the United States we find a horse-like animal about the size of a sheep, called the *miohippus,* furnished with three serviceable toes on each foot; but the middle toe is the longest and much the largest, and must have been most used. There is also a rudimentary splint-bone on each fore-leg, and we now naturally look still farther back for the meaning of this.

In the middle eocene we find the *orohippus,* another horse-like animal, but not much larger than a fox; in it we find the rudimentary splint-bone of the *miohippus* replaced by a perfect and serviceable toe, though the hind-legs have but three toes, as have those of the *miohippus.*

In the lowest beds of the eocene are found the remains of the *eohippus* (dawn-horse). This was no larger than a fox, yet had considerable resemblance to the horse, and had on its fore-feet four serviceable toes, and a rudimentary fifth toe. We look still farther back, therefore, for a five-toed true *eohippus:* it has not yet been

discovered, but may be found in the cretaceous beds, as a diminutive horse about as large as a rabbit. All modern horses may not have descended from the horse-like animals whose names I have mentioned, for in my opinion horses have been developed along several lines; but I have no doubt that all of them passed through similar metamorphoses in the course of their development, and the traces of the ancestors can be seen in their more developed progeny.

True whales, those from which the whalebone is obtained, have no teeth; but the fœtal whale has from sixty to seventy teeth on each side of the jaw. The whale is probably descended from some carnivorous mammal, that had teeth and used them; but some of its descendants became so varied that baleen took the place of teeth, which only appear to-day in the unmodified fœtus.

The apteryx of New Zealand is a wingless bird; yet the wing-bones, reduced to mere rudiments, are there. Living as its ancestors did in a country where there were no mammals to disturb it, flight was unnecessary, and by disuse the wings became smaller; and the modified descendants of the flying ancestors have but horny claws where the wings once were.

Boas and pythons, those gigantic snakes, have rudimentary hind-limbs, consisting of a few small bones suspended in the muscles on each side, and terminated in a horny claw, which appears on the outside. These rudi-

mentary limbs are good evidence that their remote ancestors could walk. Among lizards to-day we may almost see the steps by which ancient lizards were modified into snakes. In the family of the *scincidæ*, we find the genus *scincus*, with short feet and a body nearly cylindrical and covered with scales. In *seps* the legs are very weak and set far apart; so that it trusts little to its limbs, and wriggles along like a snake. It is not surprising to find animals in which the reduction of the limbs has been carried farther still, and only a few bones in some cases are left to show where the limbs have been.

Nor is man destitute of similar indications of his previous ancestors. In most persons the ability to move the ears is gone, though the rudiments of the muscles by which the motions were once effected are still there. (Fig. 31.) In the skeleton of man we can still see the bones of the tail, that must have characterized his progenitors, but which was lost long before the appearance of humanity.

### PALEONTOLOGICAL RESEMBLANCE.

The resemblance that exists between living animals found in certain districts of country and the fossil animals found in the recent tertiary deposits of the same districts is another pointer.

In South America there are found at this time the sloth, the armadillo, the cavy, or guinea-pig as it is some-

times called, the ctenomys, and platyrrhine or broad-nos-trilled monkeys; but none of these are found in Europe, Asia, or Africa. In accordance with this the bone-caves of South America, belonging to the recent tertiary period, furnish us with fossil sloths, armadillos, cavys, ctenomys, and platyrrhine monkeys: they are not, however, of the same species as the living ones, and they are generally

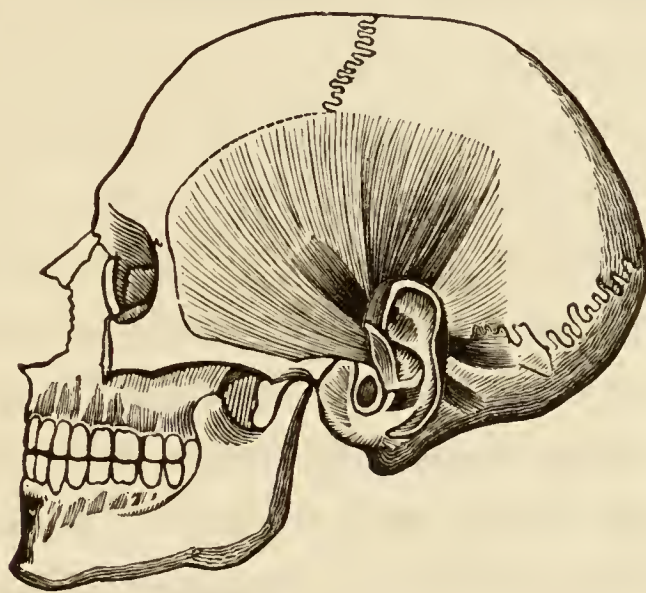



FIG. 31. Rudimentary Ear-Moving Muscles in the Human Head. (After Haeckel.)

much larger; but none of these are found in recent tertiary deposits of Europe, Asia, or Africa. If the present mammals of South America are the modified descendants of its tertiary mammals, this is just what we should expect; but if the species of animals were miraculously created, no good reason can be given why these forms should have been restricted to the South American continent, when they can just as well live on all the others.

New Zealand has very few indigenous mammals, a bat, a mouse, and perhaps a kind of fox, being all; but it has a family of wingless birds, of which there are three species. In accordance with this no fossil mammals have been found in New Zealand, but several species of wingless birds, some of gigantic size.

Of more than forty species of mammals indigenous to Australia, all but one or two are marsupial; and the fossil mammals, though in some cases as large as the rhinoceros, were also marsupial. If the wingless birds of New Zealand and the pouched mammals of Australia are naturally descended from similar, though generally more gigantic, wingless birds and pouched mammals of the tertiary times, this is just what we should expect to find; but, if animals were specially created for their respective localities, why should such countries as Australia, Tasmania, and New Zealand be destitute of the horse, the sheep, the bos, and the goat, to which they are so well adapted?

### GEOLOGICAL SUCCESSION.

This is also an important pointer. Had man made his appearance on the planet with no preceding forms at all resembling him, had the animals of the present time had no predecessors in the earlier times with which we could connect them, we should have naturally supposed that they were created instantly and full-grown. But man is

only the last link of a chain that extends through the ages: we do not see all the links; but we see a sufficient number to assure us that they are all there, and the chain has never been broken. If man has come by gradual advancement from the simplest organic forms produced spontaneously, we should find, as we trace living beings backward through the geologic ages, that they constantly become simpler in structure, and bear a nearer resemblance to the primitive forms, from which we may reasonably suppose them to have been developed. This is just what we find. Below the pliocene tertiary, all traces of man are lost, but his brute relations, the monkeys, are numerous: as we descend, these become smaller in size, and possess smaller and smoother brains, till in the cretaceous beds all traces of the monkey are gone. Mammals, however, remain until we reach the triassic age, when we find the largest smaller than a rabbit and as bird-like in its organization as the opossum. Below the trias the highest animals are reptiles, whose remains are found through the triassic age and the Permean, when they also disappear, and amphibians, the next lower organic link, are the highest representatives of life. These continue until we reach the earliest portion of the carboniferous period, when we bid farewell to the amphibians. Backward still to discover what life's organic beginnings were like. Here in the Devonian are fishes, enormous fishes, mailed fishes, but nothing higher has yet been found;

for millions of years we retreat through the Devonian, through the Upper Silurian, the fish dwindling in size and numbers at every step, till at last even fishes have vanished. But shells remain, some of them enormous; orthoceratites, fifteen to twenty feet long, their muscular arms outspread and their spire-like shells pointing upward, as they crawl over the sea-bottom and seize their prey. We pass through the Silurian into the Cambrian; and, as we go, the shells dwindle, till the largest is no larger than the finger-nail; and the shells in their turn disappear. Is there any thing left? In the very lowest beds of the Cambrian we find radiated, fan-like forms, belonging, it is generally believed, to the radiata; and these are the highest expressions of life. If eozoön should prove to be an animal, then in the very lowest beds in which the remains of organic beings have been found, the protozoa, the lowest of all animals, are the only evidences that we find of life's organized embodiment.

### INSULAR ORGANIC RESEMBLANCE.

The resemblance that is found between animals and plants on islands and those found on the neighboring mainland constitutes another important pointer. On the Galapagos Islands, which are six hundred miles northwest of South America, are found birds, tortoises, iguanas, crabs, beetles and plants, nearly all differing specifically from those of other localities. Darwin, who visited

the islands, and carefully examined the animals and plants, says, "Here almost every product of the land and water bears the unmistakable stamp of the American continent. There are twenty-six land-birds, and twenty-one, perhaps twenty-three, of these are ranked as distinct species, and are supposed to have been created here; yet the close affinity of most of these birds to American species in every character, in their habits, gestures, and tones of voice, was manifest. So it is with the other animals and with nearly all the plants." The animals and plants of New Guinea in like manner resemble those of Australia, to which the island is contiguous. Those found in Java are like those living on the Asiatic continent. Cape Verde species resemble those of Africa, near to which it lies; and those of New Zealand are like the species living on Australia, the nearest large body of land.

We cannot conceive that a Creator, as the Galapagos Islands successively came up from the bottom of the sea (for they are volcanic), made the birds, tortoises, iguanas, crabs, beetles, and plants for them like those of the nearest land, yet specifically distinct from them. It is evident that when the Galapagos Islands arose from the deep, they received most of their tenants from the neighboring continent: some may have been developed there, some flew there, some were blown by the winds, others wafted by the waves, and still others carried by birds

Separated as they were from the original forms for long periods of time and under different conditions, they deviated from them so far as to produce new species, but the likeness to their progenitors is still retained.

Had the islands never received any tenants from other localities, they would probably have been peopled by animals and plants exclusively indigenous; but for life to advance from the protozoa, to reptiles and birds, may require, even where conditions are favorable, vast ages for its accomplishment.

### ANTIQUITY OF MAN.

If man first made his appearance upon this planet about six thousand years ago, then we can be sure he is not of natural origin: nothing short of a miracle could have given him in so short a time the perfection to which we know he had attained at about that period. If we can prove that he has been here for a hundred thousand years, it does not follow that he was not miraculously created; but, taken with a multitude of other concurring facts, this also points in the direction of man's natural evolution.

It is but a short time since it was generally taught, and almost universally believed, that the earth is but six thousand years old, and that it, together with the rest of the universe, compared with the known portion of which our planet is small as an invisible atom, were made in six

days, of twenty-four hours each. This Liliputian chronology is, indeed, still insisted upon by some antiquated theologians, and taught in many of the Sunday schools, even of New England.

The young but lusty science of geology has made great havoc with this venerable idea: tearing down the curtain our ignorance had woven, it revealed to our astonished gaze ages innumerable, stretching away into the past so far that our mental eyes were strained in the attempt to see their distant boundary, while marching through them we beheld a procession of innumerable life-forms, many of them such as painter never limned and of which poet never dreamed.

It seems strange to us now, that, with so many marks of the earth's great age surrounding us, we could ever have made so grave a mistake as we did. Here are trees that must have been saplings at the dawn of creation, supposing that creation to be as recent as was then believed; deltas, such as those at the mouths of the Mississippi and Ganges, that must have taken at least half a million of years to form; cañons a mile deep, made by rivers that must have rolled through them for ages; and seven miles of fossiliferous rocks, abounding with the remains of myriads of strange beings, that could only have come into existence and become extinct during periods too large for the human intellect to grasp.

The evidences of man's great antiquity are now as

clearly presented to the eye of the archæologist, as that of the earth's so much greater age is presented to the vision of the geologist; so that, as J. P. Leslie says, "we can regard as perfectly certain that the known historical period is a mere nothing in point of time, compared with the periods during which our race has actually inhabited the earth; or, as Lyell significantly expresses it, this historical period is comparatively only a creature of yesterday. In this opinion all students of the subject now agree, even those who were formerly the most obstinate of its opponents." Again he says, "My own belief is but the reflection of the growing sentiment of the whole geological world, — a conviction strengthening every day, as you may with little trouble see for yourselves, by glancing through the magazines of current scientific literature, — that our race has been upon the earth for hundreds of thousands of years!"[1]

If we had to depend upon tradition alone for our knowledge of past events, we should be able to look back but a short distance in the history of humanity. In this country the great events of the American Revolution would be vivid in the minds of many, and we might learn the truth with regard to the most important; but the discovery of America by Columbus would exist only as a faint tradition, and the history of the world before that time would be all but a perfect blank. In fact, it has

[1] Man's Origin and Destiny, p. 66.

been found that tribes having no written records lose the most important events in their history in a hundred years.

By printed and written documents, handed down from one generation to another, we can, however, pass up the stream of time, and mark important events that have transpired for thousands of years. We thus learn that Jesus, the Galilæan reformer, lived nearly nineteen centuries ago; that Socrates, the sage of Greece, died four centuries before that; that the poet Homer sang about five centuries earlier; and that Solomon's reign in Jerusalem is separated from our time about twenty-nine hundred years. All scholars agree that dates received from written documents prior to this are very uncertain. The date of Abraham's birth has been placed at about thirty-five hundred years ago, and this is probably not far from the truth; yet, in the time of Abraham, Egypt was a flourishing nation, with kings and princes, and a civilization of great antiquity.

When written documents fail, monuments and inscriptions, especially those of Egypt, enable us to travel much farther into humanity's past. The Pyramids of Egypt are in some respects the most remarkable exhibitions of man's constructive ability on the globe. The largest covers about twelve acres: it is four hundred and fifty feet high, and is estimated to contain more than six million tons of stone. Lenormant, the French historian, says of it, "With all the progress of knowledge, it would

be, even in our days, a problem difficult to solve, to construct, as the Egyptian architects of the fourth dynasty have done, in such a mass as that of the pyramid, chambers and passages, which, in spite of the millions of tons pressing on them, have, for sixty centuries, preserved their original shape, without crack or flaw."

The age of this pile is uncertain, but may be safely set at five thousand years. Humboldt makes the following statement regarding the age of it, and the two pyramids in its vicinity: "The valley of the Nile, which has occupied so distinguished a place in the history of man, yet preserves authentic portraits of kings as far back as the commencement of the fourth dynasty of Manetho. His dynasty, which embraces the construction of the great pyramids of Ghiza, Chefren, and Cheops, commences more than thirty-four hundred years B. C."

But this was in the fourth dynasty of Egyptian kings; civilization in Egypt must have been vastly older than this. Humboldt, referring to the age of that pre-existing civilization, says, "In the dimness of antiquity, which constitutes, as it were, the extreme horizon of true historical knowledge, we see many luminous points or centres of civilization, simultaneously blending their rays. Among these we may reckon Egypt, at least five thousand years before our era."[1] Baldwin says, "It is now as certain as any thing else in ancient history, that Egypt

[1] Cosmos, vol. ii., p. 114, Harper's edition, 1856.

existed as a civilized country not less than five thousand years earlier than the birth of Christ."[1]

We are back now nearly seven thousand years, and we find Egypt is a civilized country; and this presupposes a period of many thousand years, during which the people were passing from a condition of barbarism to that of civilization. Can any light be shed upon this still more ancient time? We find in all civilized countries, where the materials could be obtained, that man passed successively through an age called the stone age, when his implements were made of stone, and another called the bronze age, in which they were made of bronze, before he attained to the iron age and historic civilization. We have reason to believe that iron was used in Egypt when the Pyramids were built. But we find bronze chisels in her ancient mines, and bronze adzes, hatchets, saws, falchions, and battle-axes in her most ancient tombs. Older than all these, however, was her stone age, when iron, tin, and copper were alike unknown. Enormous quantities of flint implements have been discovered in Egypt, says W. Boyd Dawkins.[2] Sir John Lubbock found flint implements in Egypt in great numbers, on the slopes of the hills, on the lower plateaus, and, "in fact, wherever flint was abundant and of good quality." Several that he found resembled those discovered in the gravel-beds of the Somme.[3] Many have been found by other col-

[1] Pre-historic Nations, p. 32.

[2] Nature, vol. xiii., p. 245.

[3] Journal Anthropological Institute, vol. iv., p. 215.

lectors; and it is unquestionable that in the valley of the Nile, man advanced from gross barbarism, at a time when a rudely fashioned stone was his only weapon to defend himself against the wild beasts that must have then lurked in the valley, step by step, doubtless painfully and slowly, to brick-moulding, monument-chiselling, pyramid-raising, and the civilization that characterized him seven thousand years ago.

The earliest portion of this stone age, judging from what we know of it in other countries, must have been enormously remote. In England, Wales, Scotland, Ireland, on the Hebrides, the Orkney and Shetland Islands, in Ireland, France, Belgium, Germany, Scandinavia, Greece, Italy, Portugal, Russia, Spain, Switzerland, and Turkey, Palestine, Egypt, China, and Japan, have been found within the last twenty-five years, hundreds of thousands of arrows, celts, chisels, axes, hammers, knives, and other articles of stone, which represent the stone age in human history, long before man had formed the first letter to record the steps of his progress.

Around the shores of the lakes of Switzerland and Northern Italy, we can read most clearly the story of the bronze age and the more recent part of the stone age in human history; for during that time human beings occupied houses built on platforms laid upon piles driven into the lakes around their borders; and for thousands of years there they lived, worked, kissed and married, quar-

relled, laughed, wept, and died, dropping from time to time their tools and utensils into the lake, where they were covered with mud, and were thus well preserved. At Morges on Lake Geneva, at Nidau on Lake Bienne, Estavayer, Cortaillod and Corcelettes, on Lake Neuchatel, 4,416 objects of bronze were found, consisting of axes, knives, lances, sickles, pins, rings, ear-rings, bracelets, fish-hooks, &c., yet not a particle of iron, and but few objects of stone. At Morges fifty bronze axes were found, and not one of stone.

At these places it is evident there were settlements during the age of bronze. In them lived a people who melted copper and tin, and cast various bronze articles, for à bar of tin and moulds for casting have been found. These people, as we have learned from their remains, cultivated the soil, domesticated animals, and possessed the arts of turning pottery and weaving cloth. How long this was ago we cannot yet tell. It may have been since the Pyramids were built; but, if so, we cannot regard it as long subsequent to that event, for history knows nothing of these lake-dwellers.

But before them dwelt a people in Switzerland much more rude, — the men of the stone age. At Wangen on Lake Constance, Pont de Thiele on Lake Bienne, at Moosedorf on Lake Moosedorf, and at Wauwyl on Lake Lucerne, there have been collected 3,994 articles made of stone and bone, axes, flakes, whetstones, corn-

crushers, axe-handles, awls, &c., yet not a single article of bronze or iron. M. Lohle found at Wangan, on Lake Constance, eleven hundred axes, one hundred whetstones, one hundred and fifty corn-crushers, two hundred and sixty arrow-heads and flint-flakes, besides three hundred and fifty articles of bone, and one hundred of earthenware, and yet not a trace of metal.

These were a ruder people: they cut down trees by burning around them, and cutting off the charred portion with their stone axes; their pottery is very rude and coarse; the potter's wheel was unknown, and the baking was poorly done; the only ornamentation consists of simple lines or furrows. They were by no means savages: they practised spinning and weaving to a certain extent, and made rude cloth of flax; they had domesticated the dog, pig, horse, goat, sheep, and at least two kinds of oxen. They fed very largely on the flesh of wild animals; among them the urus, or great fossil ox, the bison, the elk, the stag, and the wild boar, which are no longer found in Switzerland, and the beaver, bear, and ibex, which are now rare. The Swiss archæologists generally assign to this stone period an age of from five to seven thousand years.

Many of the stone tools and weapons found in the Swiss lakes, and which represent this age, are very well formed, and others were finished by laborious rubbing and polishing. There was, however, a still older period in human

history, when all the stone weapons and implements were rude and unpolished. The time when the Swiss lakes were occupied by men who were in the stone age, and the time when men carefully fabricated and polished their articles of stone, has been called the neolithic age, or the new stone age; and the older time, when they made only rude and unpolished weapons, has been called the paleolithic age, or the old stone age; and this carries us very much farther into the past. When we go backward to the old stone age in France, Belgium, and Great Britain, we find ourselves in a strange land, and in strange company. Sheep and goats are entirely wanting; the hog is very rare, and there is no reason to think it was domesticated; while the remains of strange animals, some of which are only strange, however, in those countries, are found in great abundance, such as the mammoth, reindeer, musk-ox, ibex, marmot, chamois, and the woolly rhinoceros, indicating a very cold climate; and the cave-lion, cave-tiger, cave-hyena, machairodus, hippopotamus, and other species of rhinoceroses and elephants, in all probability smooth-skinned, indicating a warmer climate, and one even warmer than exists to-day in the countries where we find these remains.

We thus find the paleolithic age naturally dividing itself into two periods, in the former of which the climate was very much colder than it is now, like that of Northern Greenland and Lapland, and the other in

which it was considerably warmer, something like that of Southern Africa. The cold period, we have good reason to believe, was the glacial period, and the warm period was pre-glacial, or pliocene tertiary, before the winter of the ages came on.

In caves of France, Belgium, and Great Britain, have been found in great abundance implements of stone and bone, associated with the remains of various arctic animals, showing us that man must have lived in the heart of Belgium and France a life very similar to that of the Esquimaux, surrounded as he was by similar conditions to those that surround them; while in the same countries we find abundant evidence of his occupation of those lands during the previous warmer time, when the hippopotamus bathed in the Tees and the Humber, when gigantic elephants wandered through the woods of France and England, when lions lurked in their caves, and various species of the rhinoceros wallowed in their pools.

From Mr. Pengelly's careful study of the formation of stalagmite in Kent's Cave in Devonshire, England, he calculates for the formation of five feet of it, which covers up implements that were deposited by man, and the bones of extinct animals, no less a period than three hundred thousand years.[1] This may be an extravagant

[1] Lecture of William Pengelly, F.R.S., on the time that has elapsed since the era of the cave-men of Devonshire.

estimate; but the stalagmite covering represents but a small portion of the period of man's occupancy of the South of England, as presented in this cave. I have seen the beds of gravel in the neighborhood of Abbeville, from which M. de Perthes obtained so many flint weapons (Fig. 32), in connection with the remains of the

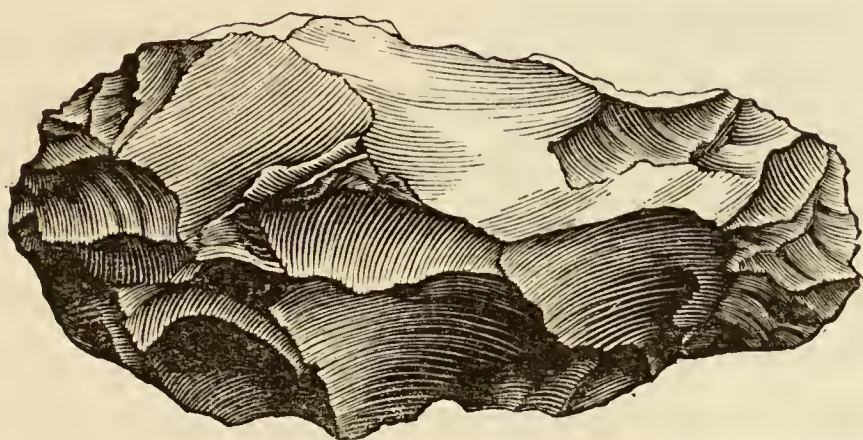



Fig. 32.—Spear of the Paleolithic or Old Stone Age, from the gravel-beds of Abbeville, France. (Original.)

elephant, rhinoceros, hippopotamus, &c.; and I have no doubt that those weapons lay on the banks of the Somme during the pre-glacial time, as I have seen innumerable chert weapons lying on the banks of American streams, and that they, when the ice suddenly melted that lay over the country to the north during the glacial period, were swept by the waters of the swollen river into the old bed of the stream, now the gravel deposit, where they are discovered at the present time. I think no geologist can place the commencement of the glacial period nearer to our own time than a hundred thousand years, and then

he must think there is a strong probability of its being much more remote.

Still more ancient must be the remains of man, found in pliocene beds of California. Professor J. D. Whitney, in a lecture delivered in Cambridge, Mass., thus refers to the most ancient human remains known to us at the present time: "During the pliocene, California and Oregon became the theatre of the most tremendous volcanic activity that has devastated the surface of the globe. The valleys of the rivers in the Sierra were filled, and much of the country, particularly toward the north of California, was entirely buried in lava and ashes. Since then the rivers, seeking new channels, have made for themselves deep cañons, leaving their old beds deeply buried under the lava. These old buried river-gravels are very rich in gold, and extensive tunnelling into the sides of the mountains and under the old lavas has been done. In one of these old river-bottoms, under the solid basalt of Table Mountain, many relics of human art have been obtained." In 1866 a skull was found on Bald Mountain, near Angels, in Calaveras County, one hundred and thirty feet from the surface, under four beds of lava, and in close proximity to a petrified tree.

"The age of these deposits under the lavas is known to be pliocene, on account of the remains of the contemporaneously buried flora and fauna, which were almost totally unlike the flora and fauna of California at the

present time. That the skull was found in these old, intact, cemented gravels, has been abundantly proved by evidence that cannot be gainsaid. At the time it came into the speaker's hands, the skull was still embedded in a great measure in its originally gravelly matrix. . . . In and about the skull were found other human bones, including some that must have belonged to an infant." (Fig. 33.)

Fig. 33. — Calaveras County Skull. Carefully drawn from a photograph.

When lecturing at Sonora, near where the skull was found, I visited the spot, and talked with men who were conversant with the facts regarding its discovery, and became satisfied that there is no reasonable doubt of its genuineness. We only need to glance at the position of the skull (Fig. 34), and learn the facts regarding the age of the beds that lie above it, to learn that man's age upon this planet is immense. Professor Whitney sums up the facts in connection with the discovery of human remains and relics in ancient Californian deposits, in language of which the following is a portion :- "There is a large body of evidence, the strength of which it is impossible to deny, which seems to prove that man existed in Califor-

nia previous to the cessation of volcanic activity in the Sierra Nevada, to the epoch of the greatest extension of the glaciers in that region, and to the erosion of the present river cañons and valleys, at a time when the animal and vegetable creations differed entirely from what they now are, and when the topographical features of the State were extremely unlike those exhibited by the present surface."[1] Man in California saw a lava stream flow for forty miles down the bed of the old Stanislaus River; and we now see that lava stream, in consequence of the wearing-down of the surrounding rocks, a mountain, known as the Table Mountain. "There has been, therefore," says Whitney, "an amount of denudation during the period since this volcanic mass took its present position, of not less than three or four thousand feet of perpendicular depth."[2] The rock that

FIG. 34. — Bed in which the Calaveras County skull was found. 1. black lava, 40 ft.; 2. gravel, 3 ft.; 3. light lava, 30 ft.; 4. gravel, 5 ft.; 5. light lava, 15 ft.; 6. gravel, 25 ft.; 7. dark brown lava, 9 ft.; 8. gravel, 5 ft. (in this bed the skull was found); 9. red lava, 4 ft.; 10. gravel, 17 ft.; 11. slate.

[1] Auriferous Gravels of the Sierra Nevada of California, by J. D. Whitney, p. 288.

[2] Geological Survey of California, vol. i., p. 244.

has thus been denuded is principally hard slate; but the trap of Table Mountain seems almost indestructible by time. It stands to-day a monument of man's immense age on our planet, for many human relics have been found under it in various places; and we see that there has been, in all probability, hundreds of thousands of years for man to advance, from the brutality that must have characterized him at his advent, to that civilization which is represented by the monuments of ancient Egypt.

### BRUTAL CHARACTERISTICS.

Lastly, the brutal characteristics of man at an early stage of his existence is direct proof of his natural origin. If man was created by miracle, the earliest specimens of the race we should naturally expect to find the most perfect specimens that the world has seen, as nearest to him who came perfect from the hand of his maker: but, if he was evolved from an ape-like ancestor, we should expect to find the characteristics of the brute appearing with greater distinctness in proportion to his antiquity; and this is what the facts demonstrate.

Let us hear what Professor Wilson says of the ancient man of Britain, or, as he calls him, "the primeval Briton:" "Intellectually he appears to have been in nearly the lowest stage to which an intelligent being can sink; morally he was the slave of superstitions, the grovelling character of which can be partially inferred

from the indications of his sepulchral rites; . . . his cerebral development was poor; . . . the few implements that ministered to his limited necessities disclose only the first rudiments of that inventive ingenuity which distinguishes the reason of man from the instincts of the brutes."[1] Neither saints nor Apollos were those ancestors of ours; and those who so much dislike to hear of our relationship to brutes may be ready to deny that these wretched creatures were of our kin.

Prichard says, "I have seen about half a dozen skulls found in different parts of England, in situations which rendered it highly probable that they belonged to ancient Britons. All these partook of one striking characteristic, namely, a remarkable narrowness of the forehead compared with the occiput, giving a very small space to the anterior lobes of the brain, and allowing room for a large development of the posterior lobes."[2] But just in the very way that they differed from existing British skulls, that made them so remarkable to Prichard, did they resemble the skull of the ape, which also gives a small space to the anterior lobes, where the man-brain lies, and allows room for a large development of the posterior lobes, in which the brute-brain is lodged. These old Britons, then, were so much nearer to the brute than the modern ones, that their skulls tell the story at a glance.

[1] Pre-historic Annals of Scotland, vol. i., p. 40.

[2] History of Mankind, vol. ii., p. 92.

"Abbe Frere, canon of the cathedral of Paris, has lately formed a collection of ancient skulls, sent to him from all parts of Europe, and has deduced from a comparison of them the general conclusion, that, in proportion as the skulls belonged to an ancient and primitive race, in the same proportion the frontal region is flattened, and the occipital developed."[1] The older the skulls, the more brutal were the men that carried them.

Marcel de Serres says, "The human skulls found in various parts of Germany, in caves, or in drift deposits, are altogether different from those of the present inhabitants of the country." Some, he says, resemble those of negroes, others the crania of the ancient inhabitants of Chili and Peru. Professor Spring says of these crania, "The pieces of human skull show that the forehead was short and much inclined."

Professor Schaffhausen, on the primitive form of the human skull, concludes with these words: "We may regard it as beyond doubt that a skull which does not bear the signs of a low organization cannot be regarded as derived from primeval man, even though it may have been found among the bones of extinct animals. . . . We must now place the man of the primeval time a step lower than the rudest savages of the actual world."[2]

1 Dr. Laycock, Mind and Brain.

2 Man in the Past, Present, and Future, Büchner, p. 266.

Again he remarks, "The shape of the forehead of the Neanderthal skull (Fig. 35), the dentition and the form of the lower jaw from La Naulette, and the prognathism of some children's jaws of the stone age of Western Europe, excel in animal-resemblance any thing of this kind among living savages."[1]

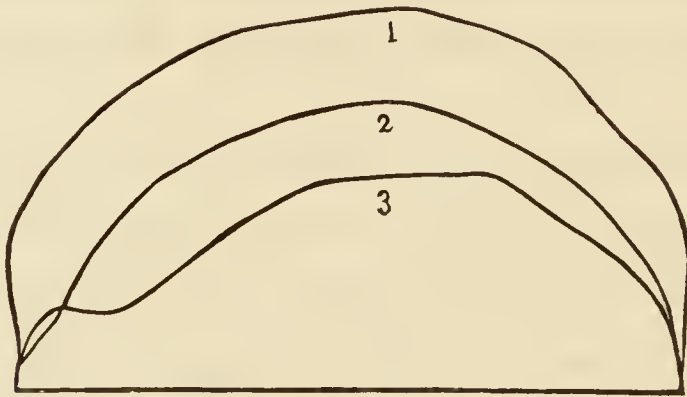



Fig. 35. — Comparison of Forms of Skulls. 1. European; 2. Neanderthal; 3. Chimpanzee. (After Lyell.)

Paul Broca, the anthropologist, says, "Thus we have arrived at the most ancient known epoch in the life of mankind. What were at that time the physical characters of man? The bones of the members which have been found prove that the stature was of little height; and though the skulls, or remains of skulls, are still quite rare, it may be considered as very nearly demonstrated that our predecessors of the quaternary had the head small, with retreating forehead and oblique jaws." He further says, that, from the evidence furnished, the quaternary man takes his place "below the lowest types of

[1] Man in the Past, Present, and Future, Büchner, p. 266.

Australia and New Caledonia, . . . and thus diminishes the interval which separates him from his zoölogical neighbors."[1]

Several ape-like lower human jaws have been found of great antiquity. One of these is called the jaw of La Naulette, since it was found in a cave of that name, in Belgium. A fragment of a worked reindeer's horn was found with it, and its age is probably that of the glacial time. It was found at a depth of about ten feet, in a deposit of river-loam. The canine teeth are remarkably wide and large, as in lower mammals, the three hinder molars are of the same relative sizes as they are generally found in the higher apes, and its prognathism is very great. Professor Schaffhausen says, "It shows a clearly animal prognathism in the absence of a chin, a feature so important in the expression of the human countenance." Dr. Carter, in a report to the London Anthropological Society, after comparing it with more than three thousand jaws of various races of men, says it presents characters which ally it to those of the colored races of men, especially the Australian, or even beyond what is found in them, and he will not "venture to deny its indubitable similarity to the jaw of a young ape."[2]

1 Transactions of Anthropological Society of Paris. Smithsonian Report, 1868, p. 306.

2 Büchner's Man in the Past, Present, and Future, p. 307.

Another jaw, found in a cave in Burgundy, at Arcy-sur-Aube, associated with the bones of extinct animals, possesses all the essential characters of the jaw of La Naulette, though to a less degree. "A human lower jaw, found in the cave of Frontal, associated with rein-deer-bones, is remarkable for the size of the molars, and the extraordinary thickness of the bone in the molar region."[1] A human jaw found at Ipswich, in Suffolk, England, regarded as of high antiquity, manifests a very low structure.

I have opened several mounds in various parts of the West, and have examined a great many ancient American skulls, and have never seen, among the most brutal people of this continent, any with heads as deficient in intellectual development as most of those must have been. The frontal bone of a skull in my possession, taken from a mound west of Minneapolis, represents the most brutal of all skulls that I have ever seen or heard of.

The older the implements are that we discover, and the ruder their form, the older the people, the more barbarous their practices; and we now know that in Scotland, England, France, Belgium, Italy, Sicily, and other European countries, the men of the early stone age practised cannibalism, for the remains of their human feasts have been found in all these localities.

[1] Büchner's Man in the Past, Present, and Future, p. 307.

Then murder could have been no crime, and benevolence no virtue. It is evident that the chasm between man and the brute, could we go back to the earliest specimens of our race, must have been so narrow, that not the slightest necessity existed for calling in the aid of miracle to span its space.

These pointers, like so many rays, direct us to the grand truth from which they proceed, — the natural origin of all organic beings, and therefore of man, who appeared on the tree of life when it was fully grown, as naturally as an apple appears upon an apple-tree when conditions have been favorable for its development.

### OBJECTIONS TO MAN'S NATURAL ORIGIN.

The too common reply to arguments of this character is that of ridicule. "Oh, that is it! we have some extinct ape for our father, and a silurian sea-worm for our grandfather: how thankful we should be to those scientific gentlemen, who have rescued from oblivion those illustrious ancestors of ours!" I know of no evolutionist who believes that man was evolved from any of the existing species of apes; yet, if we could see the brutal ancestors that fathered humanity, we should doubtless call them apes. But, if man did not come into existence as a modification of some pre-existing and inferior being, how was it done? Shall we be told that man was made out of dust? It then follows that we have dust for a man's

father, and rock for his grandfather; and this is certainly no improvement upon the evolutionist's pedigree. But we are told that man was made by God. There is no objection to this, if a rational idea goes with the word. If by God is meant a mighty mechanic, who manipulates dust or mud, moulding it into a man as a sculptor his clay model, there is no single fact in the history of the planet or of man that indicates the existence of any such being. But if by God is meant nature, all that is, or the ever-present and ever-operative spirit of the universe, then man was doubtless made by God, and made out of dust. But it is far from the dust to the man, and it has passed through myriads of forms to arrive at the man. "Yes, but I believe," says the accepter of miracles, "that man was made instantly and full-grown." But, if man was made instantly and full-grown, how were the other forms of life made? Were they also made full-grown in an instant, "whales in their bigness," birds full-feathered, horses with six-year-old teeth? If they were, there still remains to be accounted for the mighty host that rioted in water and air and on land during the geologic ages. Were all the specific forms of the geologic times created full-grown? The Silurian beds contain species of sea-weeds, corals, star-fish, crinoids, trilobites, shells, and fishes, that are never found in the Devonian beds above them nor in the Cambrian and Laurentian beds below. So the Devonian beds contain thousands of species of

plants, corals, shells, and crustaceans, no vestige of which has ever been found in the carboniferous beds above them. Every geologic formation has its characteristic species that are never found outside of it: one by one old forms die out, as the stars go down in the west; and one by one new types of life come into being, till the old are all gone, and all forms are new. But this is not only true of the great formations, like the Silurian and Devonian: it is equally true of every group of rocks into which the formations are divided. In the Potsdam sandstone, the lowest group of the Silurian in the United States, we find protozoans, radiates, mollusks, and articulates of many species, that are never found in the calciferous sandstone, the next group above it; the calciferous sandstone contains fossils that are not to be found in the Trenton limestone that overlies it; and the Trenton contains hundreds of species that are never seen in the Niagara, Clinton, and Onondaga groups of the upper Silurian. Does any man suppose that by miraculous creation, when the Potsdam sandstone was laid down, a few small shells were made and planted in a sandy coast, a few unbranching sea-weeds on the wave-washed rock, and a number of trilobites sent swimming over the water, but in the time of the calciferous sandstone, the old forms having died out, a new set of seaweeds were created and planted with longer and branching stems, a new set of shells with extra whorls, and a number of new

trilobites with shorter tails and narrower heads? The man who entertains such an idea must believe in a new creation for every new island and lake, as well as for every geological group, during the whole past period of our planet's history, — and all this for nothing; for a miracle-worker could have blown the planet cool in one moment, and set man upon a finished world in the next. Professor Owen, referring to the fact that all the old coral polyps had four rays or multiples of four, and all the recent ones six, or multiples of six, says, "These grand old groups have had their day, and are utterly gone. When we endeavor to conceive or realize the miraculous mode of origin, not of these only, but of their manifold successors, the miracle by the very multiplication of its manifestations becomes incredible, inconsistent with any worthy conception of an all-seeing, all-provident omnipotence. It is not above, but against, reason; and I may assume the special primary creative hypothesis of the successive and co-existing species of anthozoa to be not now held by the scientific naturalist." But if scientific naturalists do not believe that the different species of anthozoa, or coral animals, were created by miracle, how can they believe that other species of animals, in which the difference can hardly be considered greater, were created by miracle, such as the different species of trilobites and cephalopods that crowded the ancient seas? and if these were not created by miracle, what forms of life were? It

is safe to say, that, as to the gaze of all intelligent persons, miracle has vanished from the earth as we now behold it, so will it vanish from the earth of all the geologic past, and it will be universally acknowledged that the earth is alive, in consequence of the living spirit that embraces every atom, and that it clothes itself with plants and produces animals as naturally as a tree clothes itself with leaves and produces blossoms and fruits.

But I hear another objection: "That we are the descendants of apes, is one of the most debasing thoughts that ever entered the human mind; and it shows to what depths of degradation men will sink when they depart from the living truth." Well, if we are not descended from some animal bearing a strong resemblance to living apes, how did we come into existence? The answer I hear is, "Man was created in the fulness of time, the world having been made and prepared for his advent, not in the image of a brutal ape, but in the image of God his maker; for the Word declares, 'in the image of God created he him.'" Then I see that magnificent man: upright as a palm, with a forehead more perfect than that of Apollo; no passion had ever distorted his noble countenance, no lie had ever passed out of the gate of his ruby lips; intelligence beams from his eyes; and, as he walks, we say, "There goes a god." And his companion! language fails us to describe her: the lily and the rose vie for supremacy upon her cheeks, her eyes are bright

as the evening star, her breath is sweeter than the violet's scent, and her voice more melodious than a choir of angels. I see the lovely pair as they walk through a paradise of ravishing beauty, the boughs of the trees bending as they pass, that they may partake of their blushing fruit: daily they live in the smile of God and one another. Then I look over the earth, and behold humanity as it now is: sooty skins, thick lips, flat noses, wedge-shaped foreheads, apish arms, hairy bodies, spindle shanks, protuberant bellies, and faces that seem as if some farcical fiend had made them; while their minds and habits are in harmony with their bodies, tobacco-poisoned mouths, betel-stained lips, alcohol-fired brains, born thieves, restless murderers, souls in which passion rages like a furious storm and the brute is master of the man. And all this in less than six thousand years! At the same rate of degradation where will our offspring be in six thousand more years? Some of them chattering monkeys, fighting with their hairy brothers among the wild-orange groves of Florida; in six thousand more, grunting hogs, pushing each other for the mast that autumn shakes to the ground; then, slimy reptiles crawling over the ruins where men have been; others, retaining the human form, sink in iniquity till the earth becomes one vast pandemonium of brutality and crime, and God in his mercy at last purifies the world by fire, and a bottomless pit swallows the degraded remnant of the race.

But if from invisible gelatinous globules, that floated in the primal seas, life has advanced to crawling worm, balancing fish, hopping batrachian, tree-climbing marsupial, mimicking ape, to the men and women of this age, what may we not be in the ages to come? There is no song of an angel too sweet for us to sing, no glory that a God can bestow that we shall be unworthy to receive. The "degrading idea" appears to be very decidedly on the other side of this question.

Then I hear, "missing link," "see the immense chasm that separates man from the brute, a chasm that none but a God by miracle could bridge." There stands a pillar two hundred feet high, and on the summit I see a man; but, what surprises me, there is nothing visible by which he could have attained the eminence. I say to the by-standers, "How did the man get on the top of the pillar?" — "I can tell you," replies one, "just how it was done: an angel came down from heaven, took him by the hair of the head, and set him on top of the pillar." This does not appear reasonable to me, and I approach the pillar, to discover the way in which he ascended: on reaching the other side, I find a ladder, reaching from the ground to the summit, but I notice that some of the rounds are wanting; there is one space where the rounds are eight feet apart, and near the top there is a gap of full twelve feet. I return, and say to my informant, "I have discovered how the man got to the top of the

pillar." — "Oh!" says he, "I know very well how he got there." — "But there is a ladder on the other side of that pillar, and it is infinitely more likely that he climbed to the top by a ladder than that he ascended in any such way as you teach." — "I do not believe in your ladders," he replies: "I tell you an angel came down from heaven, lifted him up by the hair of the head, and placed him on the pillar." — "Did you see the angel do this?" — "No: I cannot say that I saw the angel do it." — "Have you seen any one that did see the angel do it?" — "No: I cannot even say that." — "How, then, do you know that an angel did this?" — "There is no other way in which the man could get up, and an angel must have elevated him." — "Yes," I say, "but here is a ladder: will you not come and look at it?" At last he moves a few steps, and, casting a side-glance at the ladder, as if he were afraid of it, says, "Do you call that thing a ladder?" — "Yes," I reply, "I call that a ladder." He answers, "Look at the gaps, see the missing rounds: I tell you no man could ever climb that pillar by any such arrangement. Here is a space fifteen feet wide, another twenty, and still another, most important of all, at the very top, thirty feet wide. I tell you an angel came down from heaven, and elevated him to the top of the pillar, or he never could have got there." But while he is speaking, I am looking, and see something sticking out of the ground that attracts my attention. I pull, and out comes one of the missing

rounds, which, when applied, fits in one of the vacant places exactly. I turn, to call the attention of my friend; but he is striding off, and as he goes I hear, "Missing links — great gaps — man — angel," till his voice is lost in the distance.

So stands the subject of man's origin. There is man on the summit of the organic pillar, and extending from the very dust of the ground to him is the ladder of life. The miraculous origin of man is the angel-elevating theory, and has scarcely any thing beside its age to recommend it. Here in the ladder are the rounds of protozoan, articulate, fish, amphibian, reptile, bird, lower mammal, higher mammal, man, and a multitude of intermediate forms. But we hear of "missing links." Certainly, how could it be otherwise? A hundred years ago, and we did not know of the existence of the chain, nor dream that there were any links: now we are finding new links every year. Once the space between the reptile that crawls, and the bird that flies, was immense; but the discovery in the Jurassic beds of the pterodactyle, a flying, bird-like lizard, the archeopteryx, a feathered animal with teeth, and a long, vertebrated tail (Fig. 36), the ichthyornis and the hesperornis, in the cretaceous beds of Kansas, the odontopteryx in the London clay (Fig. 37), birds with teeth that ally them to the reptiles, has furnished us with the links that almost unite those widely divergent types; and we may yet find, extrava-

gant as it may appear, every link of the chain that unites monad and man.

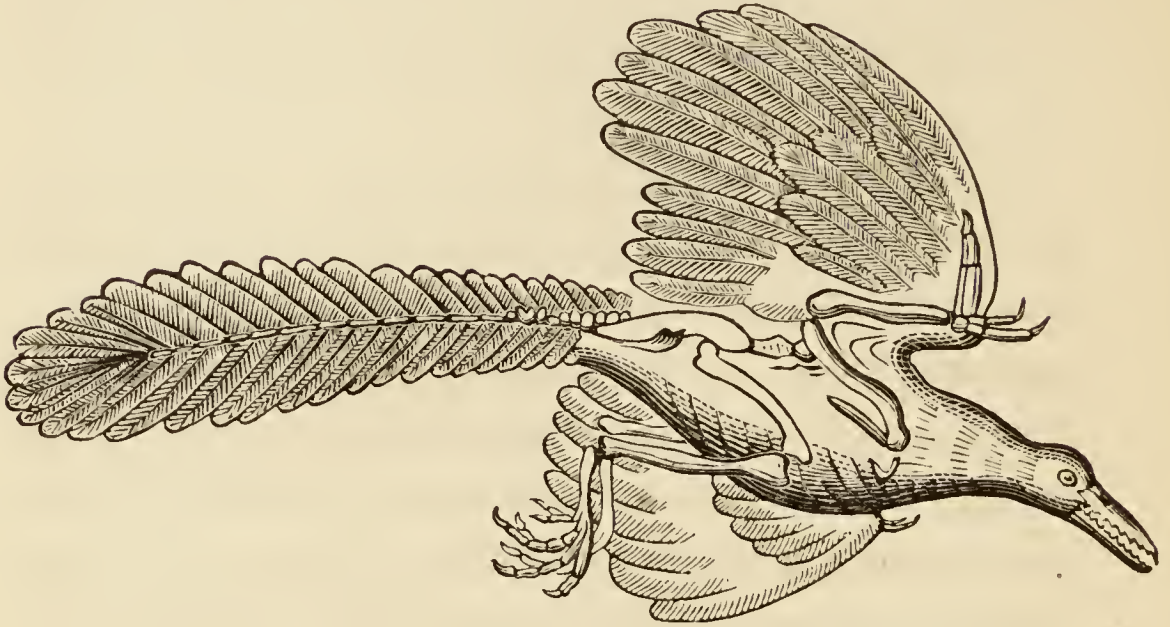



FIG. 36. — Archeopteryx Macroura, restored. (After Owen.)

Another objection that has been urged is, that we see no such changes now. It is presented in this form: "If men were ever developed from monkeys, why are they not developed now?" And the questioner seems to expect, that, for the development theory to be true, by watching an orang-outang for a few hours he might see the bowed form become erect, the sloping forehead expand, the hair drop, and the being hold out his hand and inquire, "Am I not a man and a brother?"

FIG. 37. — Skull of Odontopteryx Toliapicus, restored. (After Owen.)

Not thus does development proceed. Here is a clock, the minute-pointer of which makes a revolution in a thousand years. We look at it at noon, and again at night, but observe no apparent change: we see it next day and the next week, but the pointer, to all appearance, has never moved: we should naturally believe that the clock was standing; yet in a thousand years it sweeps the entire face of the dial, and in a million years a thousand times. If all species of animals gave birth to new species at the same rate, by a process so slow as to be imperceptible, within the space of a geologic period every animal would have produced thousands of new species. A clock might be constructed in which the minute-pointer would be immovable for a thousand years, and then make the revolution of the dial in an instant. Under such circumstances, those unaware of its peculiar mechanism, and unable, while they looked, to see a movement, would have but little faith in any statement of change that had taken place in the position of the hands.

Suppose we have never seen a new species come into being, which is not strictly correct: neither have we seen a new mountain-chain heaved, a new river-valley worn out, nor a new geological formation laid down; but by careful examination we can see the processes at work, by which all these are being accomplished. A worm, eating into the heart of an apple in the autumn, is told by its

neighbor, when it inquires where apples came from, that they are formed from blossoms, and that the blossoms are modified leaves. "Why don't we see blossoms turn into fruit, and leaves into blossoms, now?" says the worm. The answer is, "Because it would take a longer time to observe the process than the life of a worm would furnish;" and on the tree of life the transformation from one species to another may take a longer time than the life of a man, or even of a nation, furnishes.

A strong objection against the natural origin of man is this: "If man came from the brute, then like the brute man will die." If the brute becomes extinct at death, which is by no means certain, it would not follow that man would also cease to exist. Here is a green apple: we take out its undeveloped seeds, and plant them, but they die, and are resolved into dust. Here is a ripe apple: we take out the seeds, and bury them; they do not die; sending rootlets downward, and shoots upward, they grow into perfect trees. Between those seeds that did not grow, and these that do grow, there is an infinite difference, and yet what makes it? A little more sunshine, a longer connection with the tree and its vitalizing sap, and life has obtained a hold on the seed that can bid defiance to the wet of the autumn, the cold of the winter, the wind of the spring, and even make helpers of these to enable the seed to develop into the tree. In like manner I can imagine a pair of anthropo-

morphous apes, somewhat superior to the gorilla, brutes, if you please, that would cease to exist at death, under favorable conditions giving birth to a being superior to themselves, with a more expanded front brain, born of necessity a brute, but ripening into the man, so that at death his spirit bids defiance to the elements, and enters into the spirit realm, the first of earth's inhabitants to occupy the fair abode.

Lastly, it has been said that those who advocate evolution are desirous of driving God out of the world, and so reducing man to the level of the brutes, from which they believe him to have been derived. The belief in a mechanical or day-laboring God must die with increasing intelligence, and it is worse than useless to attempt to save it; but this is no hap-hazard world, nor is man a mere come-by-chance. We are not the accidental result of a million accidents, each fortunately, yet accidentally, contributing to the grand result. Nor is man a grand ruin, the beauty of whose fragments reveals the perfection of the original structure. No almighty architect built after his eternal designs a magnificent palace, whose beauty made even celestial on-lookers rejoice, and then permitted a moral earthquake to shatter it, so that nothing but a divine re-creation could ever restore its pristine perfection.

But there is a spirit in the universe, and what for want of a better word we must call an intelligent spirit: without

this it is inconceivable that we could have had this living, growing, intelligence-permeated planet, that adorns itself with grassy blade and tinted flower; without this how could organized life have developed like a tree, leafed in the vertebrates, blossomed in the lower mammals, and fruited in humanity, which loses its sourness as the ages pass, becoming more sweet and juicy as it ripens in the beams of a sun that shines upon all and never sets?

If intelligence is necessary to build a house, and to construct a watch, how much more to produce a man! his eye, that drinks in light from stars so distant that the light by which we behold them left them before the Pyramids were reared; his ears that catch the insect's lazy hum as readily as the thunder's diapason; his thinking, hoping, loving soul, with its deep yearnings, its grand questionings, its explorations from beyond the Milky Way to the infinitesimal points that float in a drop. If it took a hundred million years to fashion man, is the wisdom, the power, any less than if he had been shaped out of mud in a moment? If in man's production a million million forms were brought into existence, each nearer to him than its predecessor, is the work any less than if in a moment miraculous fingers had moulded his wondrous frame? Infinite, unseen, intelligent spirit, life of our life, spirit of our spirit, to understand thee we need to be infinite as thou art. "Nearer to thee," will be our prayer as the ages of the future bear us on.

It is true that some evolutionists have advanced very fanciful theories to account for the origin of life and man. Darwin's theory of life's commencement upon our globe will not bear very close scrutiny. He thinks it probable that "all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed by the Creator."[1] That all living beings have descended from one form is the only reasonable supposition, if we accept of undirected variation and natural selection as the grand agents in the production of species. All living beings have too much in common to be the product of originally different organic forms, accidentally operated upon by surrounding modifying circumstances. But when we attempt to realize the actual performance, there is nothing in the wildest myths that have come down to us from the darkest ages less scientific or less reasonable.

It must have been in the Laurentian or pre-Laurentian age when it was done. The earth is prepared, after ages of conflict between fire and water, for the advent of life. Here is the warm, shallow ocean that laves the entire globe, with only here and there dark, hilly islands that dot its surface. Life has no chance upon the land, it is too hot for its sustentation; and the ocean is its only possible home. Mr. Darwin does not inform us whether he believes the Creator made the original progenitor of all

[1] Supplement to Origin of Species.

living beings, and then breathed into it the breath of life, or whether it was produced spontaneously without life, and then life was breathed into it. If the former, then we have the Creator making, breathing into, and dropping into the water, the lonely protozoic Adam, that is to be "the father of all living," a microscopic gelatinous globule, the single tenant of a boundless ocean. Is this conceivable? The creation of Adam out of dust is infinitely more so. If the Adamic protozoan came into existence spontaneously, but destitute of life, we have the strange fact of life's product preceding life itself; for the body of even a protozoan must be as much the product of life as the body of a whale. Imagine a Creator breathing life into a non-living protozoan, nothing miraculous done for the world during all the preceding ages, nothing miraculous done for it since. A lonely protozoan, destitute of a companion till it spontaneously divides, starts on its journey without map or guide, all one whether it becomes a griffin or a god. He who breathed into it the breath of life, utterly indifferent to its fate, though he has worked a miracle to bring it into existence, sends it out to be operated upon by "temperature, food, moisture," and "surrounding circumstances" in general; the result of which is mollusk and fish, reptile and bird, mammal, and man, with his forehead to the sky, and his soul reading the book of the universe. Nothing more improbable was ever dreamed, nothing less reasonable was ever written.

Follow this protozoic and protoplasmic Adam. He becomes constricted in the middle; the constriction deepens and widens till it divides the verdant ball in two, and now there is a pair, identical in every respect. Each of them becomes the parent of a child, his very image, for he is his half. What chance is there for this self-dividing protozoan to take the next organic step? About the same chance that there is by planting willow-slips to raise an orange-tree. Leave out spiritual direction in the development of life, and the wisest man is as helpless to account for what we behold as the unschooled child.

My opinion is that in every atom of every organized being is a perfect spiritual type, constantly seeking perfect expression in material form. When conditions are unfavorable the resultant individuals are imperfect, and become more imperfect when the conditions become more unfavorable, as the ancestor of the *amblyopsis* became blind by a life in the Mammoth Cave; and when conditions are favorable the individuals approach nearer the perfect type, as the human race becomes more perfect with every generation, being constantly surrounded by more perfect conditions. A fragment of the leaf of a begonia, with proper treatment, will make a complete plant; a newt renews its limbs when they are cut off, and a mince-meat piece of a hydra will grow into a whole animal. This is not so very remarkable if the tendency to form the individual resides in every atom; but, unless

there is a spiritual type within every portion of the hydra, what directs the growth of the fraction, develops its tentacles, and endows the perfect animal with intelligence necessary to lasso its prey? We have not yet seen perfect apples, pears, grapes, corn, or wheat; the perfect horse, bos, sheep, dog, and man has yet to appear: but these have been advancing toward perfection for millions of years, and will, I think, become counterparts of their spiritual ideals before our planet cleaves to its centre, and dies. An apple grown in a bottle can be made into the shape of a cylinder; an oak can be dwarfed to a tree twelve inches high, and yet bear acorns; the forehead of a child can be pressed into the shape of an inclined plane, and the body of a fashionable lady can be made to resemble an hour-glass. Yet in all these cases the tendency remains to produce the perfect form. Break the bottle, and the apple commences to swell in the middle and assume the rotund shape of its neighbors; feed the dwarfed oak liberally, and give its roots room, and it begins at once to tower; take off the corset, and the waist of a lady becomes more like that of a woman. So, through all the early geologic ages, the tendency to produce our grains, fruits, birds, beasts, and men existed; but the surrounding conditions were unfavorable for their production, and low and imperfect types were the result. Early types of life have vanished, because the conditions that rendered them possible have departed, and new

types have come into being, as improved conditions rendered higher expressions of the perfect spiritual type possible. Were the conditions surrounding us absolutely perfect, then man would also be, and ugliness, misery, and sin would be unknown.

## MAN'S SPIRITUAL ORIGIN.

It would seem at this time that among thoroughly intelligent people there is no room for doubt of man's natural origin. But to endow matter with the ability to make a living world and a thinking man, is to endow it with all but infinite power and absolute wisdom. There is evidently that in the universe which the knife of the anatomist cannot reveal, which the most delicate test of the chemist cannot detect, which the human eye by the aid of the most perfect instrument can never hope to see. It accomplishes with apparently the greatest ease what the combined power and intelligence of all humanity would shrink from attempting: even the leaf of an oak mocks the artists of a world. This in the universe, whose operation is everywhere visible, but whose essence forever eludes us, is infinitely more potent than all else; as much superior to what our senses reveal as that which sees is to the eye of a dead man, as that which thinks is to the phosphorus we apply to our matches. I call

this the infinite spirit, to whose influence, infinitely more than all else, we owe our existence upon this planet, the laws of nature being merely its methods of operation.

## POINTERS INDICATING MAN'S SPIRITUAL ORIGIN.

As there are pointers that indicate the natural and brute origin of man, so there are pointers that indicate man's spiritual and divine origin. One of the most significant of these is the

### MAN-WARD PROGRESS OF OUR PLANET.

In the development of the earth there has been a progress toward humanity from the start, till he appeared of whom the mute prophets of all ages have borne witness.

Many years ago I visited a factory for making cloth, in Woonsocket, R.I. I first went into the sorting-room, where the raw material was brought, and separated into heaps, of various degrees of fineness, for the work needed to be done. From this to where the wool was washed, and laid in heaps, as pure as the drifted snow. I followed it to the dyeing-room, where various colors were given to it, according to the uses to which it was to be applied. I saw it carded, spun, woven, and finished; and

in the ultimate product, cloth, I saw that for which the various processes throughout had been employed. For this the nimble fingers of the sorters, for this the dye-tubs steaming hot, the whirring wheels, the long-drawn threads, and the clattering looms in which they interlocked. Every movement of every hand and eye, the step of every foot, the motion of every wheel, contributed to the result. From the giant water-wheel that revolved in the darkness to the flying bobbin, from the broad connecting belt to the tiniest thread that joined in the mazy dance and linked hands with its dancing neighbors, one spirit animated the whole, and the one end, cloth, was kept in sight continually.

As geology enables me to look at the earth, I see it to be a great factory for making men out of granite. There is quite a difference, however, between this factory and that at Woonsocket. That was presided over by an outside intelligence, and power that planned and kept it in motion. When the water-wheel broke, they repaired it; when a belt snapped, they joined it; when a cog broke, they replaced it. During every minute, everywhere in that factory, outside intelligence and power were brought to bear, or the making of cloth would have instantly ceased. Not so with this factory: its presiding power resides within. Imagine a factory that could mend its belts, make new wheels, and, if need be, new spinning-frames and new looms, by its own inherent power, and then you imagine a factory that resembles our planet.

Sweep out of existence all the men in the world except the most brutal Bushmen of Africa, with their protruding lower jaws, their retreating foreheads and ape-like faces, and in time from them might spring physical symmetry and high mental endowment, Apollos and Venuses, Homers and Shakspeares. We believe this because there was a time, when, where the highest types of men are to-day, men inferior to the lowest Australians existed. From them have come the best living specimens of our race; and we have every reason to believe that by the operation of the same power a similar result would be produced.

The poet often sees farther and deeper than the man of science, who frequently strains his physical eyes in looking, so that his spiritual eyes are blind. Walt Whitman is right when he says: —

"Afar down I see the huge first nothing;
I know I was even there.
I waited unseen and always, and slept through the lethargic mist,
And took my time, and took no hurt from the fetid carbon.
Long I was hugged close, — long and long.
Immense have been the preparations for me,
Faithful and friendly the arms that have helped me;
Cycles ferried my cradle, rowing and rowing like cheerful boatmen.
For room to me stars kept aside in their own rings;
They sent influences to look after what was to hold me.
Before I was born out of my mother, generations guided me.

My embryo has never been torpid, nothing could overlay it.
For it the nebula cohered to an orb,
The long, slow strata were piled to rest it on,
Vast vegetables gave it sustenance,
Monstrous sauroids transported it in their mouths, and deposited it with care.
All forces have been steadily employed to complete and delight me;
Now I stand on this spot with my soul."

Look down on the hell our earth once was. Here are mounting flames that leap and sink and roll, as they are swept by hurricane blasts over the shoreless, fiery sea. Rivers of glowing metal are flowing over the sun-like surface, amber, blue, and red, so bright that they dazzle our eyes. Where is the promise of man in all this? Little do these fiery tides look like the crimson currents that are to flow through his veins; or the ruddy banks that bound them like the flesh that shall enshrine him; or the scorching breath like the air that shall pass peacefully through his lips, and feed his lungs. Yet here, in this fiery hell, is the spirit that shall develop the world into an earthly paradise, and produce man, and make him its worthy lord.

Rolling with those fiery waves, leaping with those ruddy flames, and flowing with that ardent breath, are all the forests of all ages, the birds that are to sing in their boughs, the insects that shall feed upon their leaves, the

beasts that shall browse upon their branches or crop the herbage beneath them.

And in this boundless furnace, and the smoky atmosphere that surrounds it, lies all of which man is to be composed. Here is that which shall make his bones, and the flesh that shall clothe them, the blood that shall permeate it, and the nerves that are to bind it into a sentient whole; the eyes that shall drink in light from distant suns, the brains of the world's thinkers, and all that shall evolve from them; above all, the tendency that shall cause matter to move through countless æons on the broad highway to man; and thus you and I were there. The world was pregnant with man; and the geologic formations present to us, in their fossils, so many steps of the gestative process by which he was brought forth.

Millions of years pass away, and we look again. How changed! The fiery sea is gone, the flames are dead, the metals have sunk to their cavern homes; and here is rock, heated rock, dull red in places, bare, black, desolate, craggy. Thousands of rimmed craters scar the earth's face; and we shudder as we look at the lifeless wilderness, that seems doomed to sterility forever.

There is little promise here of man, yet the world is one step nearer. Fire and frost are the great antagonists of life, and man's empire lies between them. Fire has been subdued. In this black crust we see the operation

of cohesion; and within it lurks silex, that shall enter into the composition of his teeth, and lime and phosphorus that shall help to make his bones. The age of minerals was necessary to collect the materials to build man's wonderful fabric, as well as lay the foundation on which it should stand.

A few million years more pass away, and we look again through the geologic telescope. Here is water boiling hot, and steam arising in dense clouds; lakes rolling about on obsidian plains, like drops of water on a hot stove, till they are dissipated into vapor. Spouting geysers send up immense columns of water and steam, and others intermittingly discharge fountains of black mud. Yonder are islands rising and sinking, like bubbles on the waves, obedient to the disturbing forces beneath them; volcanoes bellow, and earthquakes constantly shake the rising ground.

"But I see nothing like man, nor even life," says the on-looker: "it is as impossible here as in a boiling caldron." Very true, but you must be patient: the gods need time as truly as the men. We are a step nearer: here is water, that important element in the construction of his body. This will help to form the blood that shall course through his veins, and carry to every part the material of which his frame shall be built. Distilled on the earth, it shall cool the heat of the burning day, and make those plants grow that shall constitute his food.

These islands are the starting-points of continents, on which he shall live, and without them he could not be. Examine those rocks, and you will find quartz and mica, felspar and hornblende, and beautiful crystals of these and other materials lining the sides of crevices. A manifestation of life is here! Only mineral life, it is true, but life that causes atoms to collect and cohere in regular geometrical forms. In them we see the symmetry that will characterize the future man, and the order and beauty that will appear in his fabric.

Let us look again. The Cambrian age dawns, and vegetable and animal life are here. What a step is this! Here is life that takes up foreign matter, and yet forms an individual in which destruction and construction will go on together to make it perfect. The first story of humanity is built: all before this only prepared the ground, and laid the foundation. Story after story will now be constructed, as the ages go, till man at last is placed, the top-stone.

Peering into the water of a sheltered bay, calm as a baby's sleep, we behold the early embodiments of life. Here are masses of jelly that cover in spots the bottom of the ocean, formed of the bodies of united protozoans, that secrete lime and build cells, communicating with each other, till calcareous reefs are formed, that pave the bottom of the sea. Here, too, are fan-like forms, rooted like plants, their beautiful branches outspread, all covered with buds, and every bud an animal.

Changes take place now with greater rapidity. Life has obtained foothold, and moves on with giant strides to its goal, humanity. It is the Silurian time: fucoids hair-like, string-like, ribbon-like, make a dense mat on the rough rocks; shells innumerable strew the sandy shore, and the tenants of others are crawling over the sea-bottom. Let us examine one of these. It is a gasteropodous mollusk, — a sea-snail. What an advance is this upon all previous forms that we have seen! Here is what we may call a head, furnished with eyes; a mouth, for the reception of food, and tiny teeth. Within the mouth is a tongue, and from it a stomach and intestinal canal, that traverses the body with varying convolutions. A heart, though with only two cavities, forces blood into the arteries, which branch to all parts of the body; and a large liver assists the gills, by which the blood is purified, and fitted for the uses of the body. There is a nervous swelling in the head, that we may almost call a brain; nerves ramifying through every part of the body; and a pair of auditory organs, by which it hears, perchance, the calls of its snaily neighbors, hid among the branches of the sea-weed upon which it feeds. It is only a snail, it is true: but how much of man there is even here; and, among the innumerable variations that shall take place among the living beings that shall inhabit the earth, life will never sink below the step she has now taken. Many will branch to the right, and others to the left; but the

main trunk rises continually, whose branches shall bear man as their fruit.

With this advance has been an equal advance in all that is favorable to still higher beings. The air is purer; poison has been eliminated from it, condensed, and buried at the bottom of the sea; the water is less polluted with foreign material; the islands have been enlarged; mountains raise their heads upon them, green to their cloud-capped summits, for vegetable life has seized upon the land, and lowly plants adorn the universal earth.

What are these that go flashing through the waters, with glittering scales of bone? These are fishes, small, it is true, but what a step man-ward they indicate! Here is man's backbone; for, though cartilaginous, it performs the same office, as it occupies the same place, as that jointed, bony structure in man. Within it is the great spinal nerve; and at the head of it the brain, lodged in a bony box to hold and protect it, whose parts have the same names as those in the skull of man. Here are head, face, an eye on each side, mouth beneath, teeth, stomach, liver, gall, swim-bladder, prophesying of lungs, and four fins with little bones within, showing us where man's finger-bones shall eventually grow. Why, it is a little, scaly water-man, almost as near to him as a life in the water will permit. It can propel itself by its limbs, see and hear, hope and fear, love and hate; and more

than the foundation of both man's physical and mental nature was laid when the first fishes appeared.

Do not imagine, however, that the road to man was a highway smooth and plain, along which life moved to him without a jolt. The development of life was in some respects like the growth of a tree; but there were fearful storms, breaking off innumerable branches, sweeping off leaves and blossoms, but leaving a trunk that sent out new and stronger branches, for the urgent spirit was within, that carried it on to greener leaves and fairer blossoms. There were times when volcanic outbursts destroyed living beings over wide areas, as the prairie fires sweep off the grass; but as the prairie renews its beauty after the fire, so the world has renewed itself a million times.

Years pass, as drops down a flowing river, and we are in the Devonian age. Taller mountains pierce the sky, larger islands dot the sea, and broader rivers pour their turbid streams into the ocean. In the swamps are slender plants with curly tops, tall reeds also, with long, flat, fleshy leaves; and calamites, like giant horse-tails, wave their tapering tops. Trees of considerable size adorn the distant mountains, while tree-ferns abound on the lower grounds. Flowers gem the ground and make fragrant the air, dragon-flies flit around the rivers, and a cricket-like chirp enlivens the hitherto silent woods. We sail over the sea, and mark in its blue depths the vari-

ously colored and variously shaped polyps, forming branching trees and reefs that extend for miles, whose honeycomb-like cells are filled with the oil that they have secreted and stored, light and fuel for the coming ages. Myriads of fishes are here, some, like the *Pterichthys Milleri*, no longer than a man's finger, and others in increasing size to the dinichthys, or terrible fish, from twenty-five to thirty feet in length. This is the age of fishes, when the vertebrate foundation was broadened and deepened, on which the palace of humanity was to be reared. Fishes were then the kings of the world: they ruled for ages; and from this royal family, along many independent lines, life descended and ascended to man.

Following the Devonian age came the carboniferous, the great coal-forming period in the world's history. Now continental areas appear above the contending waves, and immense swamps are filled with luxuriant vegetation, club-mosses, tree-ferns, and calamites everywhere. Young trees, like large cabbages, are springing out of the spongy ground, and unrolling their ferny fronds. What a tangled wilderness is this! we push and climb and wade through its depths, trunks above trunks, trunks across trunks, branches interlocking, and almost shutting out the light of day. We are now on the margin of a lake, and notice the bony-plated fishes that swarm in the waters; we walk along the beach, and

are as startled as Robinson Crusoe was, when he discovered the tracks of a man on what he had supposed was a desolate island; for here is a five-digited track, looking as if stamped by some rude little hand. It is the track of some animal whose fore-feet are small and four-toed, and its hind-feet much larger and five-toed. (Fig. 38.) Vertebrate life has advanced from water to land, a grand stage nearer to man. As we advance we discover frog-like amphibians, with enormous heads, and large conical teeth; snake-like amphibians, that wriggle through the woods, and even climb the trees; triangular-headed amphibians, with sharp teeth, living principally in the water, as their exterior gills indicate, feeding on the fishes that their greater intelligence enables them to catch. Here

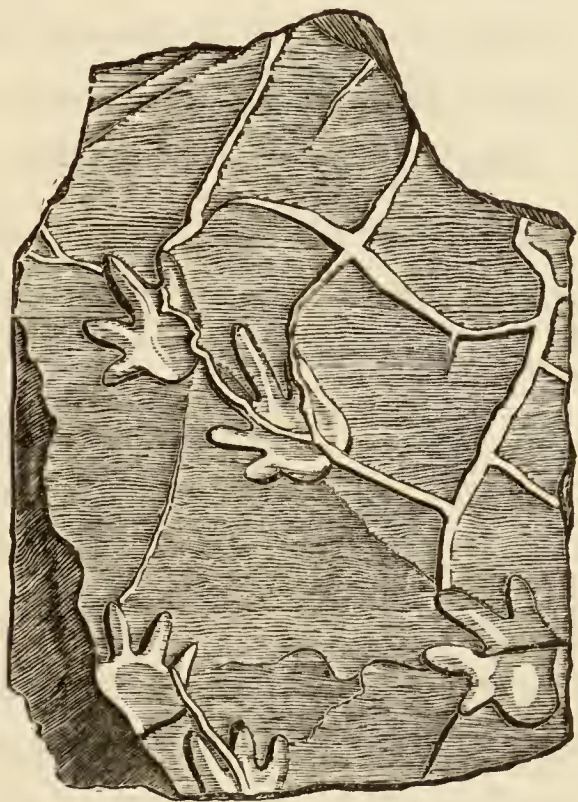



Fig. 38.— Slab of Sandstone with Amphibian Footprints, from the Coal-Measures of Pennsylvania, × 10.

are animals entirely destitute of gills, that breathe the vital air by lungs alone. They have emerged from the watery grave in which the highest forms of life have been buried for vast ages, and have been at last resurrected

to a new life. On to manhood now, with a firm step, march the living hosts.

Thousands of years again pass, as cloud-shadows over the prairies, and it is the age of reptiles, the heart of the Jurassic period. Great cycads overshadow the land, the enormous leaves of some drooping from their lofty crowns to the very ground. Pines clothe loftier mountains than the world has ever before seen, and ferns of many species beautify the woods, that grow wherever land exists, the earth around.

Basking on the rocks are scaly monsters; floating on the surface of the sea and diving in its waters are saurians as large as whales, whose combats redden the ocean with their blood; reptiles on bat-like wings are in the air, flying dragons, relentless marauders. Reptiles are now the masters; in their turn, kings of the world; but preparations are making for their overthrow. Do you see that pine which has fallen across the mountain-torrent? upon its trunk is a small mammal, no larger than a squirrel; but it marks the introduction of a new race, that shall cause all others to sink into insignificance. It is a marsupial, and of inferior organization: but its brain is the largest that has appeared, in proportion to the size of the animal; its offspring are for a time nourished in the womb and cherished at the breast; and life has passed on another stage nearer to man.

Now it is the tertiary age, the age of mammals. Enor-

mous elephants wander through forests that can hardly be distinguished from those of our warm temperate regions to-day. Lions and tigers lurk in the thickets, horse-like animals feed in the natural meadows, on whose skirts great wolves are watching them. Tapiroid animals are bathing in the water, and rhinoceroses are wallowing, like enormous hogs, in the pools by the river's side. The mountains are higher than we have before seen them, and snow for the first time appears on their tops. We can distinguish the continents, as we know them to-day, though considerable change has taken place in their shape. The scene is so familiar, we look for man, but look in vain. Aha! here are his long-armed, hairy representatives, the apes, swinging from bough to bough, and tree to tree, and feeding upon the wild figs that grow luxuriantly on the trees that skirt the wood. Here are man's eyes and nose and mouth, his teeth and stomach, his bony skeleton, in short, in every particular; his heart, his brain, his anger and love, his hate and revenge, his hope and fear, his gluttony and selfishness. The old ape scolds and threatens; the young apes chatter, and at his approach they run. The beast is playing man.

The beasts, however, advanced in brain-capacity during the tertiary period, that we can only consider millions of years in length. The early mammals of the eocene are noted for the smallness of their brains. Look at the skull and brain-cavity of the dinoceras (Fig. 39), a mam-

mal whose remains were found in the eocene beds of Wyoming by Marsh. The brain had only one-eighth the capacity of that of a rhinoceros of the same size. The earliest monkeys had the smallest and smoothest brains of all the monkeys. The oldest horses of the tertiary are those having the smallest brains, and brain-power increases with every geologic step as we advance.

FIG. 39. — Dinoceras, Skull and Brain, × 16. (After Marsh.)

At last appears the world's master, — he for whom all forces have labored for a million ages. Stunted, but brawny, hairy, nearly erect, dumb, naked, with enormous eyebrows, bushy hair that hangs down in snaky locks, his forehead "villanously low:" he wanders through the forest, stick in hand, with which he strikes the loose bark of trees, and appropriates the fat white worms as they drop at his feet. Now he is up a hundred feet high, shaking the branches; and his laugh is echoed from the rocks a mile away, as the fruit rains upon the ground. He is down and running, as fleet as a deer, to a river's bank: we miss him, it is but for a moment; we turn a bend of the stream, and here is a cave, and men, women, and children, to whom he gesticulates; and out a party sallies under his leadership, and make their breakfast on

the fruit which he has found. But fruit is not their only food. We see on the floor of the cave the bones of bears and wild hogs, of elephants and horses, caught by running them into bogs. Can it be? It is, a man's skull: why, these are cannibals! Too true: such was man about the close of the tertiary time. But man, a cannibal even, is far in advance of all that preceded him: give him time, and, by the aid of that spirit that bore him, he will outgrow cannibalism and even war. Out of such as these have come Greece and Rome, Egypt and Judæa, Moses and Jesus, Shakspeare and Goethe, Parker and Garrison, — only, however, in consequence of that continuous tendency, which, infinitely more than all else, has made us what we are.

The Darwinian theory gives us no clew to the cause of this progress. Darwin acknowledges that we are ignorant of the cause of variation,[1] though he subsequently refers to "surrounding circumstances" as the cause. Huxley says that "every variation depends in some sense upon external conditions, seeing that every thing has a cause of its own;"[2] and he refers to "temperature, food, warmth, and moisture," as among these external conditions; they are the only ones he mentions, and he evidently regards them as the most important. Warmth is only that state of temperature that is a little higher than the heat of our own bodies; consequently we have as

[1] Origin of Species, p. 120. [2] Ibid., p. 89

the principal external conditions that produce variation, according to Huxley, temperature, food, and moisture. Had there been no variation, there could have been no advancement, there would have been no chance for the operation of natural selection. We have then presented by Huxley, as the grand causes for the production of fish, bird, mammal, and man, temperature, moisture, and food. These, then, are the gods, but how utterly impotent are they! What is there in warmth, water, and food to advance a protozoan to a radiate, a worm to a fish, and an ape to a man? A frost in the spring-time stops the growth of the cucumber-plants, and the heat of a hotbed with water and food causes them to grow in the heart of winter; but what could these do in the formation of plant or leaf, if the life-bearing seed was not present? Food can make a hog fat, with suitable temperature and a proper proportion of water; but how long must the farmer feed it before it shall take wings, and change its sty for the eagle's eyry? Changes as great as that have taken place during the geologic epochs; and to attribute them to food, warmth, and water, may be considered philosophical, but is certainly not reasonable.

Add the influence of natural selection to the effect produced by warmth, food, and moisture, and how far can we then advance? Natural selection preserves a variation that is beneficial to the individual, because those that do not possess it, in the struggle for life are over-

come, and die. If variation without tendency could have made a protozoan like a radiate, what advantage would it have been? where the radiata can live, so can the protozoa; and they thrive well at the bottom of the deep seas, where radiates are almost entirely wanting. What, then, should have produced the progressive step from protozoa to radiata? What benefit could it have been to a radiate to become a worm, or a worm to be transformed into a fish? Life might just as well have continued in these lower forms as long as the planet could produce them. Why, then, this steady, continuous advance through the ages to man? Start an ant from Boston to the Mosque of Omar in Jerusalem, and the chances would be greater of its arriving there than of life arriving at man, from its first organic start in the Laurentian or pre-Laurentian time, without a guide.

### THE RACE DEVELOPMENT OF ANIMALS.

As the individual development of animals in the womb of the parent is an evidence of the natural origin of species, so the race development of animals in the womb of time is an evidence of their spiritual origin. Take the horse: the earliest horse-like animal known to us is called by Professor Marsh the *eohippus* (the dawn-horse). This was certainty a million of years before the appearance of the true horse, and in all probability two or three millions. Professor Marsh says, "In the structure

of the feet and in the teeth, the *eohippus* indicates unmistakably that the direct ancestral line to the modern horse has already separated from the other perissodactyles."[1] As early as this, then, the ancestors of the horse had separated from the other odd-toed, hoofed quadrupeds, and started for the goal, — the modern horse; and during all the subsequent ages they never left the track, though there were many stragglers that turned to the right and left, and were lost.

The day follows the dawn because the sun is below the horizon and is rising; and the horse followed the dawn-horse because the spiritual ideal of the horse was below the geological horizon, and only time and favorable conditions were needed for its perfect embodiment.

As we advance toward the present time, we find the *orohippus*, which is a little larger than the *eohippus*, and shows a greater resemblance to the modern horse. The *mesohippus*, which follows, in the lower miocene, is about as large as a sheep, and, as Professor Marsh says, is "one stage nearer the horse." In the upper miocene comes *miohippus*, which "continues the line." In the lower pliocene comes *protohippus*, still more like a horse; and in the upper pliocene the *pliohippus* (more horse), the most horse-like of all the equine ancestry; and following this comes the true horse: every step is a step horseward. The man who saw an artist making a statue could not be

[1] Introduction and Succession of Vertebrate Life in America, p. 31.

more certain that he was following an ideal, as the block became more and more like a man, than we can be that Nature was following an ideal, as she brought into existence these successively more and more horse-like forms, till the animal appeared as he is known to us to-day. What caused these forms to approach nearer and nearer to the horse in a direct line for millions of years? To answer, "struggle for life," "survival of the fittest," "natural selection," "moisture, food, and warmth," and ask us to accept these as sufficient to account for it, is to make a demand on our credulity such as no defender of dogmatic theology ever surpassed. There never was a keener struggle for life among inferior animals than there has been since man appeared on the planet, — a struggle so keen that in it many have gone down, and others are rapidly approaching extinction; yet we not only fail to see a new species developed *as a consequence of this struggle*; but we do not even see a step taken in that direction.

Swine, camels, deer, oxen, elephants, and other mammals were preceded during the tertiary period by many species of animals allied to them, and approaching nearer at every step to the animals at present known by those names. There were numerous offshoots, such as variation, modification, and natural selection might produce; but these died out, as the lower branches of a tree so frequently die, the main stem continuing toward the

perfect type. Undirected variation, even when aided by natural selection, offers no sufficient explanation of these facts. As far as we can see, the orohippus was just as well adapted to its surroundings as the horse, and would have subsisted just as well in our meadows as the horse, though it would have been much less serviceable to man.

### ORGANIC DISTRIBUTION.

Another pointer which indicates man's spiritual origin, as well as the spiritual origin of other organic beings, is seen in the geographical and geological distribution of plants and animals. By this I mean the existence of allied plants and animals in such geographical and geological positions, that it seems evident they never could have been the descendants of the same progenitors. Darwin himself generously furnishes us with facts that cannot, I think, be explained on the principle that natural selection has been the most potent agent in the production of new species. Between forty and fifty of the flowering plants of Terra del Fuego, "forming no inconsiderable part of its scanty flora, are common to Europe, enormously remote as these two points are; and there are many closely allied species."[1] In addition to these almost all the lichens, forty-eight mosses, and many other cryptogamous plants, are identical with species existing in Great Britain. But how could these, fitted for a climate

[1] Origin of Species, p. 326.

like that of the southernmost point of South America, migrate from Europe, or those of Europe migrate from Terra del Fuego, a distance of more than seven thousand miles, across a broad ocean and the heated tropics? At the Cape of Good Hope, European species are found, which have not been discovered in the intertropical parts of Africa. What is still more remarkable, the plants, fishes, and crabs of New Zealand resemble those of Europe. Twenty-five species of sea-weeds are common to New Zealand and to Europe, that are not found in the tropical seas that lie between them.[1] Several European plants are found on the southern mountains of Australia, and some on the lowlands. Had the European species wandered from Australia, or the Australian species from Europe, or had both wandered from some intermediate locality, it does not seem possible that they could have been subjected to such a difference of temperature, as they necessarily must, for such a long period of time, without specific change. Should our botanists wander over the temperate regions of Venus, is it not probable that they would find mosses and grasses, see fish in its waters, and algæ along the sea-washed shores? If Darwinians, they would then speculate upon the possibility of meteorites from the earth having dropped the necessary seeds upon the planet that gave rise to the allied forms. Two genera of salmons "from South America,

[1] Origin of Species, p. 327.

New Zealand, and Australia, are analogous to European salmons."[1] To account for such facts, the glacial period is supposed to have exerted a cooling influence over the whole globe, so that during its continuance plants may have been able to migrate over what are now intervening hot spaces; but the more we know of the glacial period, the more restricted are we led to regard the influence of the cold during the time, and any refrigeration of the climate of the tropics sufficient to allow of the migration of north temperate plants across them would have been sufficient to destroy all tropical vegetation.

The mariner finds on the rocks of the South Shetland Islands, lying to the south of Cape Horn, patches of grass, mosses, and lichens, closely resembling those that he sees on the rocks of Iceland, as far north of the equator as that is south. Are these descended from the same progenitors? or are they not independent developments from spontaneously generated microscopic organisms, under the influence of that tendency toward certain definite forms which operates in the animal and vegetable kingdoms, as all acknowledge that it does in the mineral kingdom?

Great breadth of separation, either in time or space, is generally represented by great organic differences, the species of different geologic formations and of different continents being but seldom alike; yet the resemblances

[1] Mivart's Genesis of Species, p. 163.

that are found between the animals and plants of the various geologic periods, and on widely separated portions of our planet, point to some other cause than community of descent for their explanation.

In the slaty rocks at Braintree near Boston, which are sometimes called Cambrian and sometimes primordial, for they are older than the Potsdam sandstone, we find a large trilobite, *Paradoxides Harlani.* In Bohemia, Austria, in beds of about the same age, we find also a large trilobite very similar to it, *Paradoxides Bohemicus.* The places where they lived were separated by many thousand miles, and the progenitors of the two species must have been apart, we may reasonably suppose, for ages; yet the variation is exceedingly slight.

At Cincinnati in Ohio; Richmond, Ind.; Frankfort, Ky.; Trenton, N.Y.; and Mineral Point, Wis., — we find a trilobite, *Calymene senaria.* A quite similar trilobite is found at Dudley, England, and at Gothland in Sweden. They are found at the same, or about the same, geological horizon in both countries; and although the European one is called by a different name, *Calymene Blumenbachii,* the only difference is that a portion of the surface of the latter is somewhat rougher than that of the other.

The most common molluscous fossils in the Potsdam sandstone of this country, from Wisconsin to New York, are species of the *lingula* and the *obolus.* In beds of

the same age in England and Bohemia, it is equally true. We find in the United States accompanying them a pteropod of the genus *Theca;* and we find this to be the case, both in England and Bohemia.

When trilobites were abundant in the ocean that covered New York and Ohio, they were equally abundant in the seas whose billows rolled over Utah, England, and Europe generally; and when they died out in one part of the globe, they died out nevermore to re-appear in all portions of our planet. The European chain-coral of the Upper Silurian is identical with that which characterizes the Niagara group in this country, from the arctic regions to the Southern States.

The resemblance between some of the lower forms of life, that are widely separated in time, is not less unfavorable to the Darwinian hypothesis. Let any man look at the shells of the *lingulæ,* that frequently overspread the surface of Silurian slabs, and then look at the shells of modern *lingulæ,* and at first sight he could hardly distinguish one from the other. Yet they are probably separated by fifty million years. If the *lingulæ* of to-day are the descendants of the Lower Silurian *lingulæ,* what should have preserved them almost unchanged during the multitudinous mutations to which every part of the ocean must have been subjected?

Compare the sea-snails of the Silurian, such as belong to the genera *Murchisonia, Cyclonema,* and *Pleurotoma-*

*ria,* with the sea-snails on our present coasts, and the resemblance is so great, that ordinary observers call them at once by the same names. The gasteropods in Fig. 40 do not belong to the same genera, nor even the same families; yet the resemblance in the shell-covering is very great. Compare the ferns of the coal

FIG. 40. — Ancient and Modern Gasteropods, natural size. 1. Littorina litorea, a gasteropod found on the coast of New England; 2. Cyclonema bilix, a fossil gasteropod, from the Cincinnati group of the Lower Silurian; 3. Chlorostoma fimbrale, found on the Pacific coast. (Original.)

measures with our modern ferns, and even botanists find it difficult to distinguish some of them from their modern representatives. Are the snails of to-day the direct descendants of the marine snails of forty million years ago? Is it not much more probable that they are lower branches of the tree of life, millions of which have sprouted, multitudes died, but of which there are still some survivors?

If all, or nearly all, the differences that have existed and do exist between organic beings are the result of minute, undirected variations, each of which was of ben-

efit to its possessor, what incessant variation must have taken place to produce the new species that appear with every new geological group ! Not only must there have been the variations that were useful to the individual, and were in consequence preserved, but the many thousand times greater number that were not useful, and therefore, according to the Darwinian theory, could not have been preserved ; in addition to these, the variations that were useful, and were not perpetuated, in consequence of that persistency of type that characterizes all species of organic beings. With such incessant variation as this theory demands, how shall we account for the fact that the fossiliferous rocks distributed over the globe can generally be distinguished by a geologist at a glance, in consequence of the great resemblance between the fossils contained in them? This is not only true of the great formations, but it is also true of most of the groups of rocks into which they are divided. All over the planet, the fossils found in the rocks bear a close resemblance to those in the same geological horizon.

The facts seem to indicate that life has developed from distinct organic beginnings along parallel lines, as rapidly as the improved conditions of the planet permitted. As the tadpole remains a tadpole, unless there is a sufficient light to give the stimulus necessary to push it on to the frog stage, the tendency to which lies within

it, so it appears that living beings, within which lay the tendency to advance to higher forms, have developed from age to age as rapidly as the surrounding conditions became sufficiently favorable for a forward step to be possible. Better conditions have laid the higher steps of the organic ladder, from one geologic age to another, enabling life to climb to the summit.

In the axolotl of Mexico we see an animal living in a certain form for hundreds of years, and in all probability for thousands, perpetuating itself in the same form, yet, under changed conditions, suddenly transformed into an animal so entirely different, that a naturalist knowing nothing about the transformation would regard them not only as distinct species, but as belonging to different genera, if not different families. (Fig. 41.)

The axolotl is a fish-like amphibian, ten to fifteen inches long, of a grayish color, spotted with black. On each side of the neck there are branching gills, by means of which it can breathe when in the water; while at the same time it possesses lungs, and by their use can live out of the water. This animal had long been known to naturalists; but their surprise was great to learn, that, after being carried to Paris, some of the young had become transformed into an entirely different animal. It is true we see a similar transformation in the case of the frog; but the tadpole does not breed, and we have never regarded it as other than an immature stage of the

frog. It has been found by repeated experiments, that when the young of the axolotl are removed from the water at a certain stage, and kept as much as possible in the air, they are transformed into amblystomas, and the following are a few of the changes in structure which result : —

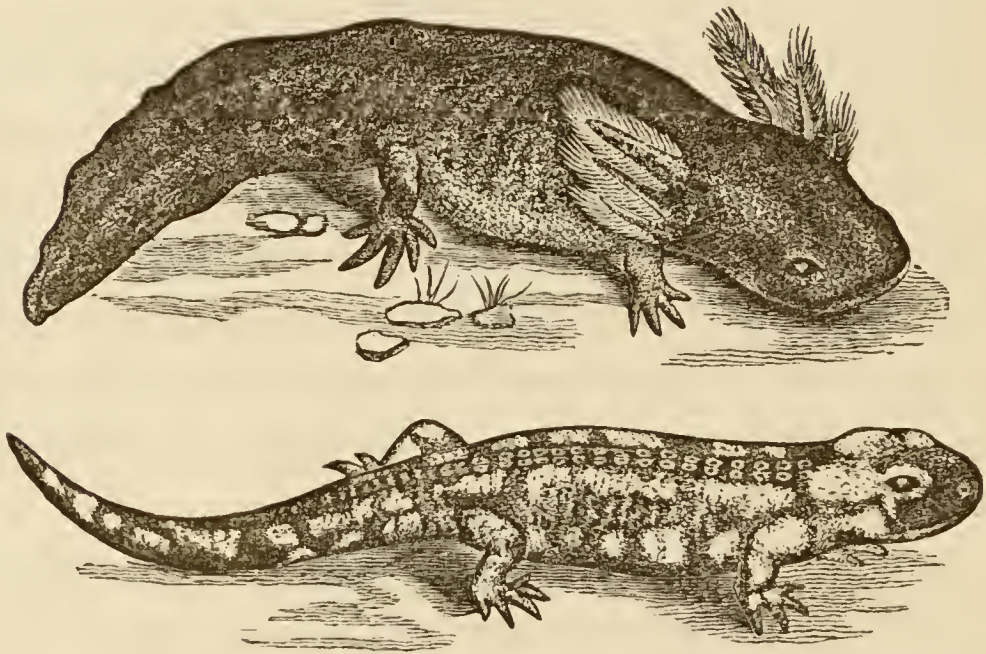



Fig. 41. — The Axolotl as it is found in Mexico. The Amblystoma into which it is sometimes transformed.

1. The gills disappear, and the clefts of the gills close up.

2. The crest on the back disappears.

3. The rudder-like tail changes to a tail that is nearly round, like a salamander's.

4. The ground color of the skin is changed from grayish black to a shining, greenish-black, on which yellowish-white patches are irregularly distributed.

5. The eyes become prominent, and the pupils small; and eyelids are formed which can close the eye completely, while in the axolotl the eye cannot be closed.

6. The toes diminish in size, and lose their skin-like appendages.

7. The palatal teeth are changed from a position in which they form an arched band, to one in which they stand in a diagonal row.

8. In the axolotl there are in the under jaw several rows of small teeth, which disappear after the metamorphosis.

9. The anterior face of each vertebra is less concave in the amblystoma than in the axolotl.[1]

For the long period of time during which the axolotl existed in Mexico, possibly hundreds of thousands of years, bringing forth beings like itself, there existed within it the power, when conditions were favorable, to make a very decided advance to the form of the salamander. Why may there not have been during the past geologic ages a power residing in various forms of organic beings, to transform them into nobler forms of life, when conditions were such as would allow the transformation to take place?

[1] See Weismann's article, On the Change of the Mexican Axolotl to an Amblystoma, in the Smithsonian Report for 1877.

## PERSISTENCY OF TYPE.

The persistency of type under the great changes to which organic beings are and have been subjected is a pointer whose significance can hardly be over-estimated in this connection. If there are spiritual ideals, as I think, which are striving to embody themselves, and organic beings are the result, it is not surprising that it should be difficult to turn them aside; and, even when they are turned aside, it is not surprising to learn that they readily revert to what may be nearer the spiritual type: but, if all beings are the result of undirected variation and natural selection, the great stability of organic forms is one of the most wonderful facts in nature. Man is found on all continents, and, from the earliest historical times, has inhabited them and all large islands: he wanders over the burning sand of the tropics, and slides over the icy snow of the Frigid Zone; he flourishes at the sea-level, and fourteen thousand feet above it; he is as frugivorous as the ape, as carnivorous as the lion, as piscivorous as the seal, and as omnivorous as the hog; yet everywhere, and under all circumstances, he always retains the type of his race. We find him black and brown, yellow and white, tall and short, fat and lean, bearded and beardless, savage and civilized, but still human. If there was no innate tendency in nature to produce man, and if he is not the fruit of the tree of life,

beyond which it cannot go, why should this be? Why not, during all this time, some indications in him of a new order of beings? If all he possesses is merely the product of variation that was beneficial to the individual, apart from tendency leading that variation in any particular direction, why not new organs appearing in man now, or during the past, say, two hundred and fifty thousand years? Why should variation and natural selection cease to operate now? A pair of eyes at the back of the head would be very useful, especially to a savage; for, while transfixing his enemy with a spear in front, he would be able to see what his other enemies were doing behind him. An individual thus endowed, in the struggle for life, would be almost certain to survive, and transmit his back-head optics to his fortunate descendants. Another pair of arms to correspond with them would be of immense service. He could then wrestle with two men at once, gather fruit before and behind, and have a much greater chance to survive. Why not, among the infinite number of variations that must be produced, if Darwinism be true, buds behind the shoulders of some babies, in the place where arms ought to grow? But we hear of nothing of this kind, and we see no variations that would lead us to think that any such thing could be possible. Astronomers scanning the heavens sorely need a telescopic eye, that would enable them to see as only the most expensive instruments now enable them. An indi-

vidual endowed with an extra pair of eye-lenses might be able to see Jupiter's moons and Neptune's satellites with ease, without instrumental assistance. Such a man would receive a larger salary, he could therefore afford to marry, and this valuable peculiarity would thus be likely to descend to his telescopic posterity. But we find no telescopic eye-sprouts, no telephonic ear indications. The tree never advances beyond its fruit, and I believe the life-tree of our planet fruited when man appeared.

Darwin's view of the origination of new varieties, which are to him incipient species, is thus presented by him: "If organic beings in a state of nature vary even in a slight degree, owing to changes in the surrounding conditions, of which we have abundant geological evidence, or from any other cause; if, in the long course of ages, inheritable variations ever arise in any way advantageous to any being under its excessively complex and changing relations of life, — and it would be a strange fact if beneficial variations did never arise, seeing how many have arisen, which man has taken advantage of for his own profit or pleasure, — if, then, these contingencies ever occur, and I do not see how the probability of their occurrence can be doubted, then the severe and often-recurrent struggle for existence will determine that those variations, however slight, which are favorable, shall be preserved or selected, and those which are unfavorable shall be destroyed."[1] He adds on the next page, "Selec-

[1] Animals and Plants under Domestication, vol. i., p 16.

tion does nothing without variability, and this depends in some manner on the action of the surrounding circumstances on the organism." There is, according to this, no internal direction whatever; and variation, under the influence of external circumstances, blindly changes every part of the structure of every animal till it produces an improvement that natural selection can preserve.

If all the forms of life now on the planet have been thus produced by slight changes from pre-existent forms preserved by natural selection, the process by which it was accomplished, we may reasonably suppose, is still going on; and, among the millions of living beings that now inhabit the globe, we ought to be able to see some on the way to new and entirely different forms, for we cannot conceive that the possible forms which variation and natural selection can produce are exhausted. Among reptiles, why not the first indications, at least, of a transformation of the fore-feet to wings, and the appearance of feathers? Why not some indications of hands to take the place of the hoofed feet of horses and cattle? It is true that natural selection might in time destroy them, for hands would not be as useful to horses as feet; but variation, being blind, can have no idea that hands are not useful to a horse. It is natural selection that decides whether the statues made by the blind sculptor, Variation, shall stand in the temple of life, or be ground to powder; and it is only, according to Darwin, by variation

blindly trying millions of times, and eventually hitting something worthy of preservation by natural selection, that hands, eyes, ears, and all other organs have been produced. We should find a proboscis or something quite as remarkable, for which we have no name, starting on the heads or tails of our canines; for how can variation

Fig. 42. — Mastiff of the time of Nebuchadnezzar. Found in the ruins of Babylon. (After Layard.)

know that a dog does not need a trunk, and how can it distinguish the head from the tail? Claws might begin to appear on the feet of the sheep, for how should variation know that they do not care to catch mice?

Dogs vary greatly: from the lap-dog to the Newfoundland is a wide space; but no one considers either

to be over the line of our familiar *canis*, and the variations of five thousand years have failed to take a single dog beyond the boundary. A difference as great as that between a dog and a wolf, or a fox, has not been known to be produced in that time. (Figs. 42 and 43.)

J. P. Leslie, in his work entitled "Man's Origin and Destiny," in reference to this says, "On the oldest monuments of the Pharaohs, the pictures of different kinds of dogs are recognized by any child as the pictures of the dogs with which he plays to-day. The pictures of the negro, the Jew, the Egyptian, the Scythian, are perfect likenesses of the Nubians, Fellahs, Jews, and Turks of to-day. There you may see, portrayed in colors six thousand years old, the same slave-traders, driving down the same slave-coffles, as in the same valley of the Nile to-day. If all the races of mankind are variants, by the law of variation, from the form of Noah or of Adam, then how infinitely remote must have been the time when Noah or Adam lived!"

Fig. 43.—The Egyptian Gazelle Dog. About 4,000 years old. (From "The Types of Mankind.")

With all the wonderful changes which variation and human selection have produced in the pigeon, going on, as they have been, for thousands of years, yet no new

species of bird has been formed: the fan-tails, pouters, and tumblers are pigeons still. The oak, the beech, the sassafras, the willow, and the poplar grew in the woods that clothed the American continent in the cretaceous time, probably four million years ago. (Fig. 44.) Out of one hundred and ten species of trees found in the cretaceous beds of Nebraska, at least half of them

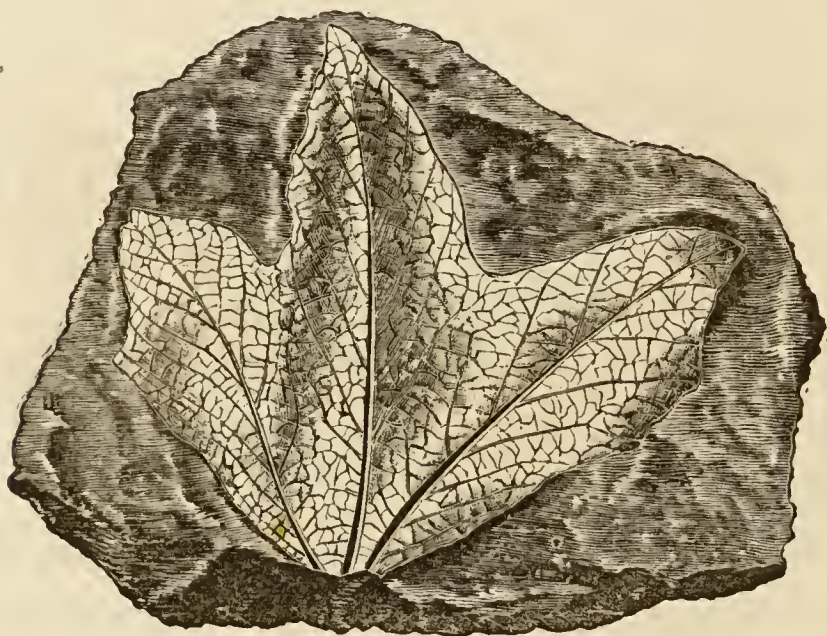



Fig. 44. — Sassafras (Araliopsis) mirabile. Lesq. From the Cretaceous Beds of Kansas. (Original.)

belong to genera now living. The most common leaf that I found in the miocene beds of Wyoming was the poplar (*Populus decipiens*, Fig. 45), and the poplar is the common deciduous tree found in Wyoming to-day. Some of the same species of trees now growing were in the old cretaceous forests. *Sassafras officinale*, the only species now growing in the United States, is found

in the cretaceous beds of Dakota. Our beech of the present time, *Fagus polyclada*, is found in beds of the same age.

The herring is one of the most common fishes now found in the ocean, and a herring (*clupea humilis*) is the most common fossil fish found in the eocene shales of Wyoming at this time. So like the living herring is it, that, when my son Sherman saw it for the first time,

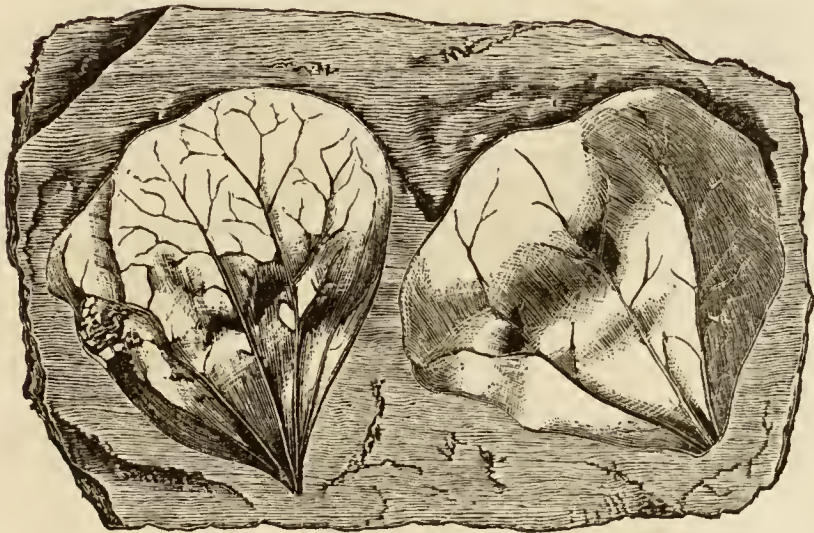



FIG. 45. — Populus decipiens. Miocene Beds, Wyoming. (Original.)

he said, "Why, that is a herring." (Fig. 46.) With variation operating without a guide, and making a million changes where only one could be preserved, there should be no such fixity of type as this; and its existence is one of the best evidences that unguided variation and natural selection have done comparatively little toward the production of the living beings which inhabit our planet.

There is evidently a spiritual influence that permeates, and a spiritual intelligence that presides over, every organic being, and rules its destiny. In the tree they lay the pipes for the nourishing sap, artistically mould the leaf, paint the blossom, and place a honey-drop at its base to tempt the insect whose offices are needed at its marriage; and they allow it no rest till the ripened fruit is formed. So has it been with the life-tree that bore

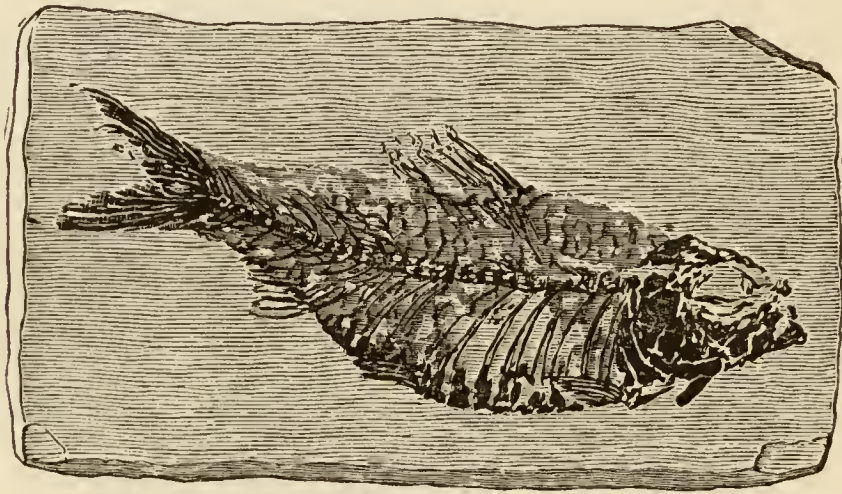



Fig. 46. — Clupea humilis. Eocene Shale. Wyoming. (Original.)

man. Why did he not remain the low-browed, ape-faced, naked, hairy, raw-flesh-devouring savage that he was when he roamed through the woods of Great Britain and France, before Niagara commenced to cut its way back from Queenstown? His hairy covering, as Wallace suggests, was a better protection from the weather than the naked backs of his descendants; his thick skull was just adapted for the warfare that he was, and is still, compelled in many parts of the world to

wage with the wild beasts around him; his capacious chest, and strong-boned, muscular frame well fitted him for a life in a world where the price of existence is a ceaseless struggle against opposing forces.

Why did the face of the primitive savage become smooth? What narrowed the nostril, thinned the lip, diminished the space from the mouth to the nose, advanced the eye from its cavernous retreat, and shortened the arms? Why did his front brain enlarge, and his back brain diminish? Why did greater beauty mark his face and frame, till the dumb, dirty, ignorant savage was transformed into the well-formed and philosophic man? Whence came his moral sense, that led him at last to sacrifice his own interest to increase the happiness of his fellows? Whence came that belief in future existence, that led him to lay by the side of the corpse the weapons of the chase that he supposed the spirit might need in another condition of being? Undirected variation, natural selection, and even sexual selection added, are utterly inadequate to account for these things.

### MULTIPLICITY OF HUMAN ORIGINS.

The Darwinian, in accounting for man, must not only account for the Caucasian, but also for the Ethiopian, the Mongolian, the Malaysian, the American, and other races of human beings, some of which are only represented to-day by outlying fragments. We only need to look at

Fig. 47, the Hottentot Venus, who died but a few years ago, and whose model is now in the Garden of Plants in Paris, to see what an amazing difference at the present time exists between some of the races of mankind. The hump possessed by this female was no unnatural deformity: many years ago I saw a female Hottentot that resembled her in this respect, and in Southern Africa they are not uncommon. Nor do racial differences decrease as we go backward in time. Fig. 48 represents the Chinese historian, Sse-ma-thsian, who was born B.C. 145.

Fig. 47. — Hottentot Venus.

The Chinaman was no less Chinese then than now. Fig. 49 is the portrait of Khoung-fou-tseu (Confucius), who was born 551 B.C. He differs considerably from the preceding; but how distinct his face is from that of any Caucasian, Egyptian, and negro! The red Egyptians, three thousand five hundred years ago, were busy as bees in the valley

Fig. 48. — Chinese Historian, Sse-ma-thsian. (After Pauthier.)

of the Nile; splitting out blocks in the quarries, hewing them into column and statue, dragging them to their appointed places, and building palaces for their kings, and temples for their gods. They were honeycombing the rocky hills, and rearing stony mountains, — in the shape of pyramids, — to make homes for their mummied dead; their scholars were studying the peoples that surrounded them, and their artists were busy representing them. The following representations (Figs. 50 to 53) were found in the tomb of Seti-Menephtha I., at Thebes, painted red, yellow, black, and white.[1] The first figure, red, represents the Egyptian, slightly modified in the Fellah of modern Egypt.

FIG. 49. — Confucius, the Chinese Sage. (After Pauthier.)

The next, yellow, represents the yellow people with which the Egyptians were acquainted; the best known to them would be the Arabians and Chaldeans, more highly colored at that time than the present Arabs and dwellers in the valley of the Euphrates. The next figure is as

[1] Types of Mankind, p. 85.

black and as distinctively negroid as the last is white and distinctively Caucasian. Figure 54 is an Egyptian representation of a negress, made nearly three thousand three hundred years ago; and in the "Types of Mankind," from which I take it, we have the following description

FIGS. 50, 51. — Ancient Egyptian representation of the races of mankind, about 3,400 years ago. The left-hand figure is red, representing the Egyptian. The right-hand figure is yellow, representing the Shemites or Chaldeans. (After Champollion.)

of a negress, by Virgil, written early in the second century: "In the mean while he calls Cybele. She was his only (house) keeper; African by race, her whole face attesting her father-land; with crisped hair, swelling lip, and blackish complexion; broad in chest, with pendent dugs (and) very contracted paunch; her spindle shanks

(contrasted with her) enormous feet; and her cracked heels were stiffened by perpetual clefts." Fig. 54 is from the grand temple of Thebes, and of the time of one of the Rameses of the twentieth dynasty. The differences at present existing between the various races of mankind were apparently just as great three thousand five hundred years ago as they are to-day; and, if we come no nearer

FIGS. 52, 53. — Ancient Egyptian representation of the races of mankind, about 3,400 years ago. The left-hand figure is black, representing the negro. The right-hand figure is white, representing the Caucasian. (After Champollion.)

to unity in three thousand five hundred years, how much farther shall we travel back before we discover the one black, yellow, brown, or white source from which all our present races flowed?

The Egyptians were acquainted with negroes, as we find from their documents, nearly four thousand three hundred years ago.[1] Rawlinson acknowledges that Babylonian monuments *alone* carry back the origin of Babylon to 3,905 years before the present time.[2] All historians agree that the earliest civilization of Babylonia was a Turanian one: hence the difference between the people living there at that time and the Egyptians must have been greater than that between the modern Chaldean and the modern Egyptian. That the Caucasian race existed as early as this, no scholar will dispute; and we are now back five hundred years farther into the past, with Egyptian, Ethiopian, Turanian, and Caucasian as distinct, to say the least, as they are to-day. Egyptologists have demonstrated that the dweller in the Nilotic valley was as much an Egyptian five thousand years ago as he was at the commencement of the Christian era, while the oldest Chaldean monuments represent a people in the valley of the Euphrates as different from them as they were in the days of Nebuchadnezzar.

FIG. 54. — Ancient Egyptian representation of a negress.

Lieut. Smith, the ethnologist, gives us his opinion on

[1] Types of Mankind, p. 181. [2] Origin of Nations, p. 41.

the subject of the fixity of races in the following words: "It may, then, be fairly said, that *unmixed* races, from the most remote historical time (nearly four thousand years), have preserved their distinguishing marks amid all the supposed causes of change, and may be considered *permanent.* The Ethiopian (negro) can no more change his skin than can the leopard his spots."[1]

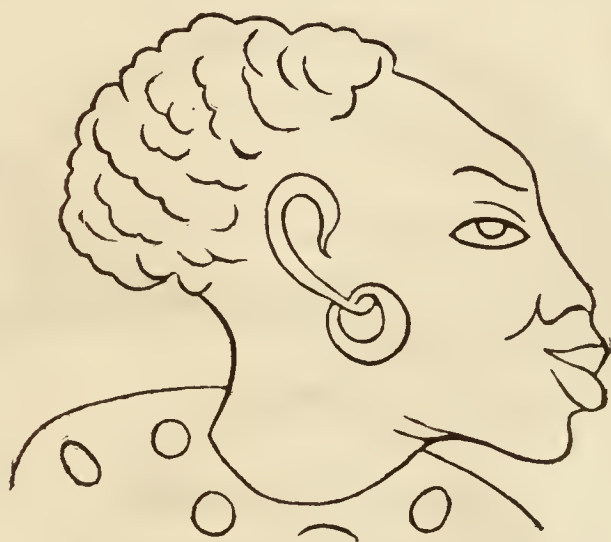



Fig. 55.—Ancient Negro.

Geology enables us to travel much farther into the past than history. Back to that strange time known as the glacial period, or ice age, we go; and in caves covered with a deposit of mud, laid down when three-fourths of Europe was under water, and icebergs sailed over the places now occupied by some of the most intelligent people of the planet, we find the remains of man. There can be no doubt that this was many thousand years back

[1] Natural History of the Human Species, p. 87.

of the historical period, and it becomes a very interesting question: Do these remains indicate that human beings were more closely allied to each other then than now? Are there any indications that we are arriving at the one trunk, from which all the branches of humanity grew? On the contrary, we have no living people on the globe, whose heads manifest as great diversity as the skulls of

Fig. 56. — The Neanderthal Skull. The upper is a side view; the lower, a front view.

these most ancient human beings show. The Neanderthal skeleton, found under a bed of loam in a cave sixty feet above the River Dussel, in the Neanderthal, when first exhibited at Bonn in 1857, impressed all naturalists that saw it with its brute-like characteristics. Professor Schaffhausen declared that it was the most brute-like of all known human skulls. When Professor Huxley saw a cast

of the skull, he said it was the most ape-like skull he had ever beheld.[1] Lyell says the outline of the Neanderthal skull shows a nearer resemblance "to that of a chimpanzee than had ever been observed before in any human cranium." (Fig. 56.) Skulls resembling it have been found in Cochrane's Cave, Gibraltar; at Borreby, in Denmark, and in the Rhine loess; and there can be little doubt that these skulls present to us the brain develop-

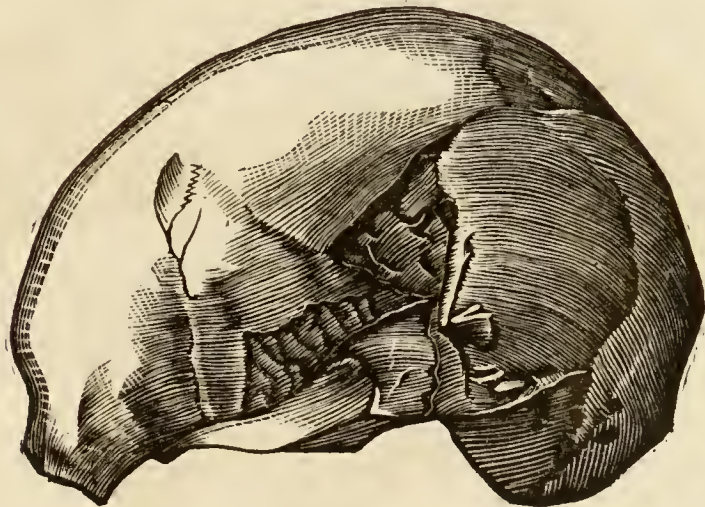



FIG. 57. — The Engis Skull.

ment of an extremely brutal race that occupied Europe ages before history or even tradition was born.

We have, however, other skulls, belonging apparently to a period as ancient as this, which, although not equal to the average skulls of the best living races, would not be out of place even on the shoulders of Europeans to-day. The Engis skull (Fig. 57), found in a cave near

[1] Lyell's Antiquity of Man, p. 79.

Liège in Belgium, with the remains of many extinct animals, and generally regarded as ancient as the Neanderthal man, is so superior in its characteristics, that Professor Huxley says it is "a fair, average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage," — from which we may learn that the Engis skull does not much depart from the average type of living skulls, and we may also learn that Professor Huxley is not a phrenologist; for the same kind of a skull never held the brains of a philosopher and the thoughtless brains of a savage. The Mentone, Cro-magnon, and other ancient skulls, are of fair development, and show the existence in Europe, at a very early period, of a race at least equal in mental endowment to that of the best savage races now upon the globe.

The following is from Professor Paul Broca, in an article on the remains of man found in the caves of Perigord, with the remains of the mammoth and other extinct animals: "The quaternary race of Dordogne (Cro-magnon) differs from the quaternary race of the Belgian caves (Fig. 58) as much at least as dissimilar modern races differ one from another. The contrast is complete, not only when we look at the conformation and volume of the head, but also if we look at the form and dimensions of the bones of the limbs."[1] But if

[1] American Journal of Science, July, 1869.

races of men at that early time existed, who were as far or even farther apart than any living races, how much farther back shall we go before these differences shall vanish?

Büchner says, "It is true that some very ancient human skeletons, or parts of skeletons, have been found, which must have belonged to comparatively large and

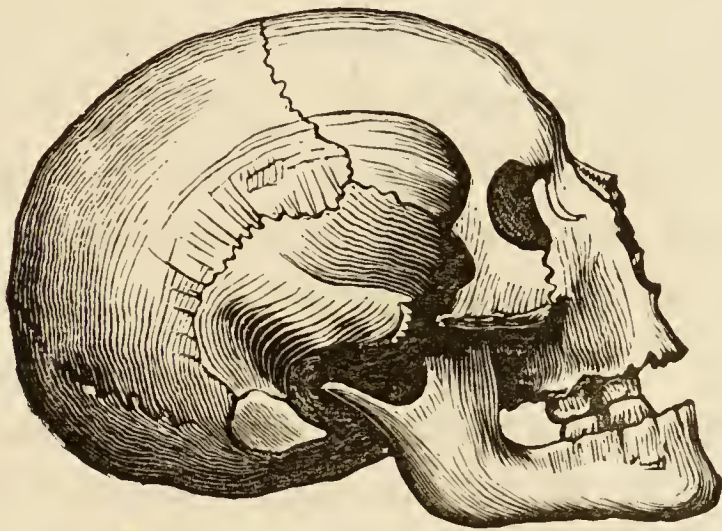



Fig. 58. — The Furfooz Skull, found in a Belgian Bone Cave by Dupont.

very muscular men, such, for example, as the skeleton of the famous Neanderthal man, and the human bones recently found by M. Louis Lartet in one of the caverns of Perigord (Les Eyzies), and probably belonging to the period of the mammoth, which seem to indicate a rude, but strong and muscular race of men, with an approximation in the structure of the bones to the type of the apes, and with prognathous jaws, but nevertheless with a comparatively good development of the brain.

On the other hand, most of the discoveries of the so-called quaternary period indicate a small race, with a narrow skull and prognathous jaws, and therefore of a type resembling that of the negroes or Mongols. In the most ancient period of the mammoth and cave-bear, the men, according to Broca, were not of large stature, had a narrow head, with a retreating forehead and oblique jaws, in fact, a general conformation of the body such as is now approximately met with in the lowest races of Australia and New Caledonia."[1] When we find the racial lines diverging for certainly more than ten thousand years, how can we believe that at any time still farther back they will ever unite?

When we come over to our own continent, we find the Calaveras skull, associated with extinct animals, and belonging to the pliocene period, the oldest of all known human skulls, pronounced by Professor Whitney to have a strong resemblance to the present Digger Indians of California. Castelnau found in the caves of the Andes, associated with extinct animals, skulls resembling those of the ancient Peruvian type, but in which the characteristics of that type were greatly exaggerated. So that the New World unites with the Old in declaring, that, as we go backward in time, there are no evidences that the races ever came from a single pair, but must have arisen from many widely differing individuals. But, if humanity

[1] Man, Past, Present, and Future, p. 50.

started from different sources, the originals must have been ape-like brutes. And what should have caused the differences between them? The differences existing in still more remote ancestors, is the most reasonable answer. Without tracing their pedigree still farther into the past, we may ask, what caused these diversified apes to advance along independent lines to humanity? Did unguided variation operate simultaneously on each species of ape from which mankind has descended? and was it equally successful in all of them in enlarging the brain, expanding the forehead, lengthening the lower limbs, shortening the upper, causing the jaws to retreat, the hair to disappear from the body, and the stooping brute generally to advance to the upright man? I think the most pronounced Darwinian would shrink from acknowledging this. But, if not, we seem driven to the conclusion that along independent lines, by virtue of inherent force, and, as I believe, spiritual direction, life advanced till it was represented by various simian types, which fathered the different races of men now living upon our globe.

### LANGUAGE.

Our ability to communicate ideas by language is, to my mind, an indication of man's spiritual origin. The first being who said *bamba* could not by the utterance have increased his chances of survival over his semi-simian

comrades. How, then, came language, that wonderfully complex instrument for the transmission of thought, which we find to be the property of even every savage?

The existence of one language would be difficult enough to account for, on the ground of mere variation, natural selection, and sexual selection; but the difficulty is very greatly increased, when we find that there are many distinct languages, and that, the farther we are able to trace them back, the more distinct they appear to be, indicating that languages sprang up independently among various people by virtue of inherent tendency.

Most of the tongues of modern Europe bear a strong resemblance to each other; but, as Müller says, "By comparing Greek, Latin, Gothic, Celtic, and Slavonic, we discover that they were originally derived from some language older still, of which they were the dialects. This language has been called Aryan; and it can be proved that the people who spoke it, so long before all written history, led the life of agricultural nomads." The Sanscrit, the ancient language of India, which was spoken for centuries before the time of Solomon, is but a dialect of the same ancient Aryan language, which was spoken on the plateaus of Central Asia when Europe was in the stone age. Indo-European is the name given to the family of languages derived from the Aryan, from the fact that they are spoken generally throughout Europe and in India.

A very different family of languages is found in Syria, Arabia, and generally in the south-western corner of Asia from the banks of the Euphrates to the Mediterranean, called the Semitic, from the notion that the descendants of Shem spoke these languages; a better name by which it is sometimes called is Syro-Arabian. The Aramaic, Chaldean, Hebrew, Arabic, and Ethiopic languages are members of this family. This is no mushroom family. George Smith, who translated the Chaldean inscriptions in arrow-headed characters, found in the mounds of Assyria, says, "The Izdubar legends, containing the story of the flood, were probably written in the south of the country and as early as 2000 B. C. These legends were, however, traditions before they were committed to writing, and were common in some form to all the country." As long ago as four thousand years, the multitudes in the valleys of the Euphrates and the Tigris were speaking a Syro-Arabian language, and their scholars were inscribing it on clay tablets to transmit to the future their thoughts and the story of their deeds. We can readily compare these ancient records with the equally ancient Sanscrit records, written in an Indo-European language; and, if these two families of languages are branches of the same linguistic trunk, we ought to find them approaching nearer to it in four thousand years: but there is no evidence of this kind. Greek, German, and Sanscrit, which branched off from the original Aryan many thou-

sand years ago, still show clearly their relationship; and certainly, if the Indo-European and Syro-Arabian languages came from the same original source, we ought to find some evidence of this in the similarity of their words or in their grammatical structure. But we do not find such evidence. Professor W. D. Whitney says, "The whole fabric and style of these two families of language is so discordant, that any theory which assumes their joint development out of the radical stage, the common growth of their grammatical systems, is wholly excluded. . . . Against so deep and pervading a discordance, the surface analogies hitherto brought to light have no convincing weight."[1] If the Syro-Arabian languages ever came from the same trunk as the Indo-European languages, it must have been before the grammar of these languages was formed; and the grammar of a language is its soul.

Alfred Maury says all the Syro-Arabian languages "distinguish themselves sharply from the Indo-European languages. They possess neither the same grammatical system, nor the same verbal roots."

Sayce is of the same opinion: he says, "The class of languages nearest akin in appearance to the Aryan is the Semitic; and here, if anywhere, upon the received theory" (that is, of all languages being derived from one) "we should expect to find the most convincing proofs of relationship. On the contrary, every thing is against it.

[1] Language and the Study of Language, p. 307.

The structure of the language, the phonology of the speech, the conception of the grammar, the character of the lexicon, alike forbid the supposition."[1]

Older than both of these, in its written form at least, is the Nilotic family, chief member of which is the Egyptian language, related to tongues that were once spoken in the North of Africa, in fact, from the Nile to the Canary Islands, and perhaps over a wide region now under the Atlantic Ocean. We have documents written in this language that are, in all probability, five thousand years old. The Syro-Arabian and Nilotic languages being geographical neighbors for many thousands of years, it is not surprising to learn that there are some resemblances between some of their words; but there is little doubt that the Egyptian language was a spontaneously formed, original tongue, much more distinct from the Arabic, Hebrew, and Sanscrit four thousand years ago, than it was in the time of Cambyses. "Egypt has been literally, for many thousands of years, the *football* of foreign conquerors; and her primordial language became infiltrated from age to age with Arabic, Persian, Greek, Libyan, Latin, and words of other tongues, known to us only at a later stage of development; but when these exotic *injecta* are abstracted, there remains, nevertheless, a stone-recorded vernacular, possessing all the marks of originality, and in itself totally distinct from the utmost circumference of Asiatic languages."[2] Even Rawlinson tells us that

[1] Principles of Comparative Philology, p. 102. [2] Types of Mankind, p. 234.

"although in some respects it presents resemblances to the class of tongues known as Semitic, yet in its main characteristics it stands separate and apart, being simpler and ruder than any known form of Semite speech, and having analogies which connect it on the one hand with Chinese, and on the other with the dialects of Central Africa."[1]

The Bask language, spoken by about three-quarters of a million people, who dwell among the Pyrenees, in the North of Spain, is like a lone island in the midst of a boundless ocean. There is no language with which we are acquainted that stands so much alone. Slight analogies have been traced between it and the language spoken by the Finns, and in some respects it resembles the American tongues; but it is totally distinct from the Aryan, Semitic, and Egyptian tongues, and as far as we can judge has always been. It is probably the only living representative of a family of tongues spoken throughout Europe before the Aryan conquerors seized the country, and drove the darker-skinned and inferior inhabitants into the mountains and most inhospitable regions.

We have found, then, four totally distinct languages, as far as we can judge, independently developed. But the Chinese language is certainly distinct from all four. "A distinguished historian and philologist, in comparing the languages of the extreme East with those of the Aryan

[1] Origin of Nations, p. 198.

group, says that 'if the planets whose physical constitution resembles that of the earth are inhabited by organized beings like ourselves, we may assert that the history and languages of those planets do not differ more from ours, than do the history and language of the Chinese.'"[1] Alfred Maury is right when he says, "The style of Genesis no more resembles that of the Chinese *Kings*, than the language of the *Rig-veda* approaches that which the hieroglyphics have preserved for us."[2]

There are at least from eight to ten root-languages on our planet, that we have the best of reason to believe have come into existence as naturally as poems have been made in all those languages. Poetry never came by natural selection, nor do I believe it ever came by sexual selection, which would be much more probable. It never came in various countries by being imitated from some one in which it had been miraculously planted. The ideal thinker blossoms in poetry spontaneously, and hence the poems of all languages differ as the languages in which they are written differ.

There are, of course, resemblances between all the languages of the globe, some of the phonic elements entering into the composition of all; but this no more indicates their original unity than the resemblances we find in the voices of the birds indicate that they learned

[1] Buchner's Man, Past, Present, and Future.

[2] Indigenous Races of the Earth, p. 28.

their songs from some original feathered singer. As Agassiz justly observes, "There is no ornithologist who ever watched the natural habits of birds and their notes, who has not been surprised at the similarity of intonation of the notes of closely allied species, and the greater difference between the notes of birds belonging to different genera and families. The cry of the birds of prey are alike unpleasant and rough in all; the song of all the thrushes is equally sweet and harmonious, and modulated upon similar rhythms, and combined in similar melodies; the chit of all titmice is loquacious and hard; the quack of the duck is alike nasal in all. But who ever thought that the robin learned his melody from the mocking-bird, or the mocking-bird from any other species of thrush? Who ever fancied that the field-crow learned his cawing from the raven or jackdaw? Certainly no one at all acquainted with the natural history of birds. And why should it be different with men? Why should not the different races of men have originally spoken distinct languages, as they do at present, differing in the same proportions as their organs of speech are variously modified? and why should not these modifications in their turn be indicative of primitive differences among them?" [1]

If languages did come into existence thus spontaneously and independently, it must have been by virtue of

[1] Types of Mankind, p. 282.

an innate tendency in human beings leading to their production. A chirping organ has been detected in the insects of the Devonian, say thirty million years ago; yet among all the variations that might have taken place during that immense period, and that must have taken place for Darwinism to be true, not a step beyond simple stridulation has yet been made. Our crickets chirp as the Devonian insects did before the coal of Pennsylvania was laid down. The quadrumana have existed since the eocene tertiary, but the monkeys are as destitute of language now as they were three million years ago. In the case of man, what should have caused at least eight or ten dumb animals, and their descendants since the miocene period, independently to form languages for the expression of thought, all well adapted to the purpose, though differing widely from each other? Why should *all* the races of men develop languages, and all other beings fail? There is nothing in the history of languages that would indicate that they were formed by the operation of variation and natural selection; while many facts point to the action of an innate tendency in humanity, forming languages as tendency and spiritual direction had previously formed the men that needed them for their further development.

TENDENCY TO BEAUTY.

The tendency to beauty throughout nature also points to a spiritual cause underlying the operations of the universe. The face of a Hottentot may be symmetrical, but we cannot call it beautiful; so that, in addition to symmetry, there is an added glory which nature's works frequently possess, that must be accounted for. It seems probable, that, if all surrounding conditions were at all times favorable, all things would be beautiful. Winter showers upon us beautiful crystals of snow, because the condition of the aqueous vapor and the temperature of the atmosphere are such as to allow the tendency toward the beautiful to operate. Quartz in shapeless masses possesses few of the elements of beauty; but, when crystallized from solutions in which the silicious particles are free to move as beauty directs, they form crystals whose beauty attracts even the most uncultivated eye. The mineral kingdom, for beauty of color and form, is not surpassed even by the vegetable kingdom; and yet selection, in the Darwinian sense, had nothing to do with the production of that color and form. When looking at the productions of the mineral kingdom, we may apostrophize beauty in the language of the poet Thomson: —

> "At thee the ruby lights its deepening glow,
> And with a waving radiance inward flames;

From thee the sapphire, solid ether, takes
Its hue cerulean; and, of evening tinct,
The purple-streaming amethyst is thine.
With thy own smile the yellow topaz burns;
Nor deeper verdure dyes the robe of spring,
When first she gives it to the southern gale,
Than the green emerald shows."

Deep in the briny ooze the *euplectella* forms her spun glass basket. There is no variety in its color, but for beauty of form it is not surpassed by the production of any organized being that is known to us. Why should the natural tendency to symmetry and beauty be considered sufficient for the production of this, and natural selection and sexual selection be called in to account for the plumage of the birds of paradise? The shells that are the habitation of the deep-sea mollusks vie in beauty of color with the plumage of tropical birds: yet selection could never have wielded the brush that laid on their lovely dyes. The soul of beauty, that spans the sky with rainbow arches, that adorns with crystals the geode's "hollow globe," that makes the marble halls of caverns, where darkness and solitude forever reign, more beautiful than kingly palaces, — this, in my opinion, infinitely more than sexual selection, made the humming-bird a flying jewel, adorned the birds of paradise with their waving plumes and exquisite colors, moulded the human form, and will, in time, make every human being fair as

our dream of an angel, and worthy of the title, a child of God.

### HUMAN FACULTIES.

Another pointer is *the existence of the essentially human faculties in man.* Phrenology as taught by Dr. J. R. Buchanan is as much a true science as geology taught by Sir Charles Lyell, and can be much more readily demonstrated. This science reveals in man the existence of reverence, modesty, benevolence, chastity, integrity or conscientiousness, spirituality, and other essentially human faculties, which it is inconceivable to believe could ever have been produced by the operation of undirected variation and natural selection. How much more likely would an ape be to survive, who was modest, reverential, conscientious, and benevolent? In the relentless struggle for life among brutes, their existence would but have rendered him a prey to the less scrupulous and the more vicious, and any variation in that direction would have produced a similar effect in proportion to the amount of that variation. Conscientiousness in such an animal would have led him to abstain from the food which another had secured; benevolence, to aid another at the expense of his own well-being; while reverence and spirituality would have tended to destroy that selfishness, without which, among brutes, death would be inevitable.

What, then, could have produced the incipient variations which led to the formation of these dominant faculties in man, which have led him, not unfrequently, to the dungeon with joy, and to the burning pile with triumph? If we could even conceive of the germs of these faculties appearing in the brutes that fathered the man, or in primitive man himself, what could have caused them to increase, as they must have done to attain their present development, when their exercise at that time must have made the individual a prey to his more brutal neighbors?

The existence of these faculties in man points to a spiritual type, — the perfect man, toward which the human race has been moving from its start, and that is destined eventually to be perfectly embodied in man, when the fruit of the tree of life is fully ripe.

### SPIRITUAL FACULTIES.

Another pointer, and perhaps the most significant of all, is the existence of *spiritual faculties in man*, for which mere variation, inheritance, and natural selection can never acconnt. If the physical eye could be accounted for by natural selection, there would still remain the much more difficult task, that of accounting for the existence of the spiritual eye. It is absolutely certain that a great many persons — I have known as many as thirty or forty — can at times see objects with the eyes

closed, as well or better than they can with them open, can see in the absolute darkness as readily as in the light, and thousands of miles off as well as near at hand. Deleuze, the well-known French magnetizer and author, says, "In somnambulists there are developed faculties of which we are deprived in the ordinary state; such as seeing without the aid of the eyes, hearing without the aid of the ears, seeing at a distance, reading the thoughts."[1] Henry George Atkinson, joint author with Harriet Martineau of the Atkinson and Martineau Letters, writes: "I had once a very remarkable patient, a somnambule, who, with the eyes closed, could easily read any writing I gave her. She read from the top of her head, or when placed on her hand, or, in fact, from any part of her body; and it was to be noticed in this case, that, the more tightly you pressed upon her eyes, the more clearly she could see."[2] Professor Weinholt in describing somnambulism says, the sleep-walker "reads printed and written papers, writes as well and correctly as in his waking state, and performs many other operations requiring light and the natural use of eyes. All these actions, however, are performed by the somnambulist in complete darkness, and with his eyes firmly closed."[3] Dr. Gregory, professor of chemistry in the University of Edinburgh, says, "The

[1] Instruction in Animal Magnetism, p. 185.

[2] Atkinson and Martineau Letters, p. 104.

[3] Mesmerism in India, Esdaile, p. 248.

clairvoyant can often perceive objects which are wrapped up in paper, or enclosed in boxes or other opaque receptacles. Thus I have seen objects described, as to form, color, surface markings, down to minute flaws and chipped edges, when enclosed in paper, cotton, pasteboard boxes, wooden boxes, boxes of papier-mâché, and of metal. I have further known letters minutely described, the address, postmarks, seal, and even the contents, read off when the letters were enclosed in thick envelopes or boxes."[1] "Vision," says M. Teste, "through the closed eyelids, and through opaque bodies, is not only a real fact, but a very *frequent* fact. There is no magnetizer who has not observed it twenty times; and I know at the present day, in Paris alone, a very great number of somnambulists who might furnish proofs of it."[2]

In the report of a committee of physicians, appointed by the Royal Academy of Medicine in Paris, I find the following: "We have seen two somnambulists distinguish with closed eyes the objects placed before them; they have designated, without touching them, the color and name of cards; they have read words written, or lines from a book. This phenomenon has occurred even when the eyelids were kept closed by the fingers."

The distinguished Parisian professor of medicine, Rostan, in the "Dictionnaire de Médecine" remarks, "There

[1] Animal Magnetism, p. 37.

[2] Quoted by Bush in Mesmer and Swedenborg, p. 107.

are few facts better demonstrated than clairvoyance ;" and he then tells us how he tested the clairvoyance of a somnambule by going into the dark, and turning the hands of his watch round, when the somnambulist in the dark accurately stated the hour and minute indicated by the pointers. This she did repeatedly without a mistake.[1]

The men who give their testimony in favor of clairvoyance are as well able to know the truth of what they state, and are as worthy of credence, as the material scientists who receive their testimony with an incredulous smile ; and the faculty in man by which it is accomplished can never be accounted for by unguided variation, inheritance, and natural selection. The persons who have possessed these faculties have been in nearly all ages the persecuted and despised ; many have been placed in lunatic-asylums because they were regarded as insane, and not unfrequently been burnt for wizards and witches. Clairvoyance is the appearance in a few of what will probably be the heritage of all, by virtue of that indwelling spirit which carries the human race to its goal.

The existence of the spirit of man after death is now scientifically demonstrated,[2] but no man will claim that natural selection is the cause of that existence. What is it, then, that perpetuates man's existence after death seizes

[1] Dr. Edwin Lee's Animal Magnetism, p. 104.

[2] See the Scientific Basis of Spiritualism, by Epes Sargent; and Zöllner's Transcendental Physics.

the body, so that our friends can return and give us as demonstrative evidence of their existence as they did while living among us? It is evident that there must have been something infinitely more potent at work than Darwinians have yet presented, to bring into existence man, the spirit.

Much of the improvement of humanity in beauty has been attributed to sexual selection. A man selects the most beautiful woman for a conjugal companion, a woman selects the most perfect man: some of their offspring advance in beauty, and, the more beautiful, the more likely they are to become parents. Suppose it true, — though it could have had but little influence in the infancy of the race, when rape was almost universal, when every woman was a mother, and every man a father, — whence came that appreciation of beauty, which led the man to choose the most beautiful woman, the woman the most perfect man? For the man to choose a more beautiful woman than he had previously seen, — and without this the race could not advance in beauty without tendency leading in that direction, — he must have had an ideal of beauty more perfect than he had ever seen embodied; and this, variation and natural selection do not account for. This is, in fact, as difficult to account for, to say the least, as the beauty itself. There is a sense of the beautiful in all of us, as there was in our savage forefathers, more perfect than any embodiment of it that the

world has seen. Many an artist can paint a more perfect face than nature has yet been able to produce on this planet. Whence comes that sense of a beauty more perfect than eye has ever beheld? The most moral man has a sense of moral perfection much in advance of that which he lives, or that he has ever seen expressed in the life of any one. Priests and poets preach and sing better than they live. Whence comes this sense of a life superior to all that we have known? Are not our souls portions of the universal soul, as every drop in the ocean is a part of the mass the moon heaves? The grand secret of the ages, hidden from all lower beings, is revealed to man; and we can see the goal toward which life has been running for so long, and to which it must arrive, — the perfect man.

We, too, are worlds, more wonderful than the ponderous globes that swim in the solar sea. Some are in the heated stage; the boiling passions have not subsided, and the heart is a fiery hell. Others are in the granitic stage, hard, flinty, dry, and selfish. Some have advanced to life and beauty; but all are imperfect. If the infinite spirit gave to the planet all those ages of the past to develop man, will there not be given him time to develop to perfect angelhood? If out of the fiery lava man has been developed, can we imagine any thing too great or too good for even the lowest and meanest man to become? The man of the mammoth period was superior

to the savage of the cave-bear epoch; the lake-dwellers of Switzerland were highly civilized compared with the occupants of the Dordogne caves, and the ancient Greeks and Romans were many strides in advance of them. There is no need for despondency, still less for despair. The stars are unmoved when the earthquake rocks a continent; and they shine undimmed, though clouds for weeks obscure the sky. The canker-worms sweep from our apple-trees every leaf; and there they stand, each an image of desolation, amid the verdure and bloom of early summer. An ignorant spectator might say, "Your apple-trees are dead." A few weeks, however, find them green as ever: they instantly commence to repair damages, and, in the steady purpose to produce fruit, never falter for an instant. So Nature, never to be balked, started ages ago to make men; and despite of heaving earthquakes, boiling oceans, sinking continents, ravaging tornadoes, devouring monsters, and life-destroying cataclysms, here we are, the mighty masters of the world, and here our race will probably be for millions of millenniums.

And what she has done for the race is an indication of what she will do for the individual. This universe is no relentless mill, whose ponderous jaws only open that they may receive and hopelessly crush us, while we are to rest satisfied because our loss is to be the gain of our descendants. All this work during the ages was not done

merely to produce man, and give him infinite desires that sickness should mock, and death extinguish. Why is life so sweet, and annihilation so terrible? Why should millions of ages have been spent to produce a being to whom future existence is so desirable, and then deny him what he of all the world only craves? There is a life after death: the past teaches it, the present declares it. Not without reason did the savage hunter of the long ago dream of a land to which the departed had gone; not to mock him did the eternal spirit place the spiritual intuition in his soul. What he dreamed, we have had demonstrated: he had the instinct, we have the knowledge. Science may seem to rob religion of its charms, but it is destined to restore them a thousand-fold. As it rises to the zenith like a sun, faith in miracle will depart like a fog that the morning drinks up; but confidence in the universal, beneficent, and intelligent operation of law will take its place. The belief in irremediable woe for any portion of humanity will vanish; and in its place will come to all the assurance of conscious, continued existence in a superior condition of being. As out of the ashes of a burnt-up world, in consequence of that divine tendency which has enabled life to conquer all enemies, to form garments of loveliness out of the shroud of death, and rainbows of hope out of the tears of despair, there has come the fragrance of the violet, the beauty of the rose, the song of the poet, the lore of the philosopher, a

mother's love, and a martyr's virtue, — so, in the apparently infinite future that lies before the human soul, by that same divine tendency, the vilest criminals, "the deepest sunk in guilt and sorrow," may rise and climb from height to height of goodness and bliss, ever looking upward, while, from still untrodden heights, a purer and more perfect ideal shall forever beckon them on.

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